



### **Sixth International Dental Congress.**

The Sixth International Dental Congress, held in London, should have gone into history as one of the greatest, if not the greatest, dental Congress ever held, if one may judge by the published program, visits to the various public buildings in which meetings, clinics and exhibits were announced, and a general observation of the plans and actual achievements of the loyal committees, laboring under the stress of the approach of the greatest catastrophe which the world has ever known. As it is, in spite of the slim attendance and sudden termination of the Congress, the published proceedings will undoubtedly make a valuable contribution to the literature and progress of dental science.

#### **General Meeting.**

The first general meeting of the Congress, on Tuesday, August 4th, was held in Central Hall, Westminster, opposite to Westminster Abbey. The President, Mr. Mummery, was loudly applauded for his addresses in French and German. He extended a welcome to all, expressing regret that the Right Hon. Herbert Samuel, President of the Local Government Board, who was to have opened the Congress, was unavoidably prevented from being present, and read a telegram of regrets from that gentleman. He next alluded with pride to the fact that His Majesty the King had honored the Congress by consenting to be a Patron, and ordered a telegram expressing homage, respect and gratitude to be sent to the King at Buckingham Palace. President Mummery

then delivered the presidential address, the following being a brief summary of some of the more salient features of what was in fact a very scholarly thesis:

**President's  
Address.**

After explaining the plan under which the Congress had been organized, Mr. Mummery spoke of the importance nowadays rightfully attributed to dental services, and claimed that such service is not alone valuable to the individual, but must inevitably redound to the advantage of the State. He declared that "caries is a preventable disease but is only preventable by the aid of co-operation on the part of the government authorities, medical men, and the public themselves." He said that the first school clinic in England was established in Cambridge in 1907, mainly through the efforts of Mr. George Cunningham. This clinic had been highly successful, as shown by the latest report, which states that 72 per cent. of the children now have sound teeth.

**Diet and  
Prophylaxis.**

After alluding to the probable causes of dental caries he expressed the belief that caries is a preventable disease. He endorsed the doctrines of Dr. Sim Wallace, who advocates a stated diet as a preventive measure in abating dental caries. In the main this depends upon "the avoidance of much sugar, more especially in the form of sticky sweets, and the termination of a meal with acid fruits, such as apples and oranges, which tend to insure a free flow and limpid condition of the saliva, which is the natural cleanser of the mouth."

He thought that this doctrine would outlive the criticism of these medical men who declare it to be "absurd," and deplored such attitude by physicians, as tending to hinder rather than advance the cause of preventive medicine.

**Limited  
Value of the  
Tooth Brush.**

Whilst considering these natural means of cleansing the mouth to be most important, he nevertheless believes the use of the tooth-brush to be very necessary, although "we cannot consider that the use of this implement, once or twice a day, will compare as a method of prophylaxis, with the habitual use of food of a nature to stimulate the flow of the cleansing saliva, especially at the termination of a meal, and most of us, I think, agree with Prof. Pickerill when he says, 'The tooth brush should be regarded as an adjuvant to other means of prophylaxis.'"

**Oral  
Sepsis.**

Mr. Mummery declared that the greatest advance in dental science in recent years has accompanied the widely spreading recognition of the Jan-gers or oral sepsis. He described in detail the

possible evils that may arise from pyorrheal conditions, and also the distant disturbances traceable to infections confined within the alveolar bones and at root ends. He then remarked:

"A very important point insisted upon by Dr. Holder is that 'ill-effects depend upon the net amount of toxin absorbed by the circulation and not upon the gross amount of toxin formed at the seat of infection. A very small focus of infection may give rise to very severe symptoms, and the causes of such infection may be very obscure and difficult to detect.'"

He then referred to the discovery with the radiograph of root end disease as the predisposing cause of distant troubles, even where the treated teeth had caused the patients no malaise, and added: "The danger from dead teeth is a very subtle one and has not been sufficiently appreciated."

The President then approached a subject, which later was most heatedly discussed in the Section meetings, where papers dealing with the treatment of pyorrhea were presented. He said that the treatment of septic teeth might be said to have divided

**Extraction Versus  
Non-Extraction  
of Septic Teeth.**

the profession into two schools: those that claim to save everything and those who advocate wholesale extractions. He himself opposed both schools as being too radical. He believed that no hard and fast rule could be set up. Teeth, of course, should be saved, but never at the possible expense of the patient's health. "The great principle to keep in view is the avoidance of septic infection. Whatever cause we find in the mouth must be thoroughly dealt with and the source of the infection removed; if septic infection by either bacteria or their toxins cannot be controlled by such treatment, the offending organ should be removed." . . . "If a tooth is ever so little septic, and that septicity cannot be controlled by treatment, it has become a serious danger to the whole body, like a gangrenous limb, and should be removed. The question arises whether we are justified in telling any patient after prolonged treatment of the teeth for pyorrhea that he is cured. According to our present knowledge we think not. He should be told that as the result of the course of treatment he has undergone the disease has been kept in abeyance and its constitutional effects prevented, and that careful attention on his part may prevent a recurrence. If assured of a cure, he goes away with a false sense of security, neglects the necessary daily observance of rules of treatment of which he has presumably been informed, and the symptoms recur."

Speaking of the retention of roots of dead teeth he says: "While we no longer relieve the pain from a septic tooth by draining it into the



mouth, a common practice some years ago, but now considered almost criminal, a great many septic roots and hopelessly decayed teeth are allowed to remain in the mouth to the serious danger of their possessors." And in relation to artificial substitutes he declares that "no appliance that is not capable of the most perfect cleansing should be considered admissible."

After discussing the woeful lack of knowledge on dental topics possessed by the majority of medical men, he attributes this to a defect in the medical curriculum. He says: "The student during his hospital training has every opportunity of acquiring a really astonishing amount of clinical and theoretical knowledge, but knows scarcely anything about the teeth. This can only be because the educational bodies have not yet come to realize the important bearing of dental disease on general surgery and medicine."

Mr. Mummery concluded with further discussion along similar lines, making an appeal for wider knowledge of dental subjects among medical men, a closer co-operation between practitioners of medicine and dentistry, a wider awakening on the part of the State to the dental needs of its citizens, and especially suggesting that the State should extend the propaganda of dental clinics, so as to include some sort of free dental service for adults. Toward the end he spoke as follows:

"We know that the old days of professional jealousy and seclusion are passed, and that these great international congresses, whatever may be their drawbacks, have been the principal agents in bringing about this most desirable end by encouraging the feeling of fraternity and the comprehension of a common interest among the nations of the world.

"The intimate connection between dental and general disease, which has lately been so much brought into prominence, points very strongly to the necessity of maintaining a high standard of medical instruction in the dental curriculum, and a still closer alliance with the whole medical profession, that they may work harmoniously together for the advancement of their common objects.

"The difficulties connected with dental education are great, but as knowledge advances it is being less and less looked upon by thoughtful men as necessarily confined to technical instruction; and although we may yet be far from the day when the one portal to all branches of the healing art shall be a medical education, with subsequent special training, this is, I think, the ideal we should keep before us, however unattainable it may now appear. The great law of evolution—the survival of the fittest—must triumph in the end."

After the delivery of the presidential address, brief speeches were made by the following gentlemen: Mr. W. B. Paterson, President of the

International Dental Federation; Dr. E. T. White, Australia; Prof. H. P. Pickerill, New Zealand; Dr. A. H. McDonagh, Canada; Dr. Wm. Johnston, South Africa; Dr. Juan B. Patrone, Argentine Republic; Dr. Vincenzo Guerini, Italy, who likewise exhibited a bronze bust of Professor Miller; Dr. Thol Shamamine, Japan; Dr. Don Miguel Denegri, Peru; Dr. M. A. Minker, Russia; Dr. Florestan Aguilar, Spain; Dr. Sten Hagar, Sweden; Dr. Arthur Leuty, Egypt; Dr. J. S. Burnett, Uruguay, and Dr. H. J. Burkhart for the United States. From the above it will be seen that a sufficient number of countries were represented to indicate that the Congress was truly international. After these addresses the meeting adjourned until two o'clock, at which hour it was reconvened. Dr. M. Roy, Director of l'Ecole Dentaire de Paris, and Dr. O. Walkohoff, of Munich, both of whom had been announced for addresses, were unavoidably absent. Prof. E. C. Kirk, of the University of Pennsylvania, then delivered an address entitled "The Tendencies in Dental Education," and was followed by Dr. W. Guy, Dean of the Edinburgh Dental School, and President of the British Dental Association, who delivered an address on "Necrosis."

After resolutions of thanks had been voted to these two gentlemen the first general meeting was adjourned.

**Closing  
Meeting of  
the Congress.**

The closing meeting of the Congress was held at Jehangier Hall on Thursday afternoon (August 6th, at 4:30 P. M.). Some routine business was transacted when Mr. Matheson made a speech which aroused the sympathy of all his auditors. He told what the Congress Committees and the English dentists as a body had hoped to accomplish in this Congress, and while he believed that in the face of unheard difficulties much had been accomplished, yet he felt that the results had not paralleled their expectations. He said that "Englishmen hate to be beaten," and that therefore he wished to make a motion that this Congress be not terminated with adjournment, but that it might be resumed and continued in two or three years.

Several gentlemen made speeches expressing sympathy with the English Committee, while at the same time pointing out the difficulties that might follow such a course, and especially the possible injustice that might be done the Spanish Committee who must arrange for the Seventh International Dental Congress in 1919.

Dr. Florestan Aguilar, speaking for Spain, then addressed the Congress. In behalf of his country he invited the next Congress to meet in Madrid. He sympathized with Mr. Matheson and his English confrères, and personally had no objection to a continuance of this Congress in London. Yet he felt bound to point out that the resolution proposed was determining an international matter over which the present body had no real control, and he suggested that an adjournment be taken without further action of an international character, the matter being left to the Executive Council of the F. D. I., who would no doubt act in accordance with the wishes of the English members. The motion as amended by Dr. Aguilar prevailed, and the congress was then adjourned.



## **Report on the Pathology of the Dental Pulp.**

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*Section II. Sixth International Dental Congress, London, 1914.*

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As we review the contributions to the pathology of the pulp we find that relatively less is known of the morbid anatomy of that organ than of any other component of the tooth, save, perhaps, the pericementum. In fact, those who have made a special study of the subject admit that they do not fully understand the normal structure and histological complex of the pulp, so that they often find it difficult to determine the degree of variance of a pathological condition from a histological form. This is due in large measure to the fact that they have met with great difficulty in perfecting a technic by which they may prepare the pulp for microscopical study with a minimum amount of change. Encased as it is in the hard dentin wall, with which it has an intimate relation, the pulp offers numerous difficulties to the process of fixation and sectioning.

Students of the subject have met with a second difficulty when they have attempted to link up the various pathological conditions of the pulp with the symptoms which accompany them. It is true that few tissues of the body offer equal opportunities for ante-mortem examination, it being possible to catch the pulp in any stage of inflammation or degeneration, but the symptomology of this organ is so obscure that great difficulty has been experienced in synchronizing the symptoms with the pathological conditions which produce them.

But in spite of the many difficulties much valuable work has been done upon the pulp, and many beautiful preparations have been made

which faithfully depict the morbid histology of that organ. The most comprehensive and complete contribution which has been made in America is that given by Dr. G. V. Black in vol. 1 of the "American System of Dentistry," by Litch. The text of this treatise, with the illustrations which accompany it, has formed the basis for many other works upon the subject which have appeared since the time of its publication.

Dr. Black, in the treatment of this subject, first  
**G. V. Black.** describes the histology of the pulp and dwells at some length upon its sensory functions. As to its symptomology, he speaks of the pulp as being a true internal organ, having no tactile sense. He goes on to say that it has a "resentment to heat and cold which is a special sense of the dental pulp; under normal conditions it has none other whatever." He reviews the symptomology, with regard to the sensory functions, and cites cases illustrative of referred pain of dental origin.

He speaks of the physical conditions which surround the pulp, which in times of hyperæmic disturbances prevent swelling, and are a restraint to œdema and the migration of the leucocytes from the blood-vessels to the surrounding tissues. He states that he has not found secondary inflammation and swelling of the periapical space as a result of hyperæmia and inflammatory conditions of the pulp, but that they occurred only when the pulp was badly affected or nearly disorganized.

Among the various pulp diseases, hyperæmia is  
**Hyperæmia of Pulp.** first considered. In his presentation of this subject, Dr. Black reviews in detail the methods of his observations, and the technic by which he prepared his specimens for study. He gives many illustrations of pulps in the various stages of disease, and detailed descriptions of the conditions found, by which the reader is led through the phases of hyperæmia, thrombosis, and inflammatory conditions of the pulp. He further says that all pulps which are exposed to the action of the saliva are inflamed, but that inflammation seldom occurs when there is no exposure. As to the sequelæ or prognosis of such inflammation, he says "the dental pulp has a considerable power of recuperations from the inflammatory state. It is certain that moderate extravasations of blood are disposed of successfully, and that a considerable bulk, considering the size of the organ, of inflammatory lymph is tolerated without destroying it, and would undoubtedly be disposed of by the tissues if the case were placed under favorable conditions. . . . Of the ability of the dental pulp, when placed in good hygienic conditions, to recover from inflammation there can be no doubt whatever."

**Infection  
of the Pulp.**

The author then considers the infections, with special reference to ulcerations and abscesses of the pulp. He has found that abscesses are far more common in the multi-rooted teeth than in those having a single root.

Of the chronic diseases, hypertrophy is first described and cases are cited in which the hypertrophy was accompanied by absorption of the dentin. Under degenerations the deposition of calco-globulin in diseased conditions and the formations of pulp stones is reviewed. The hard formations within the chamber are described as follows:

- (1) Secondary dentin.
- (2) Dentinal tumors in the pulp chamber.
- (3) Nodular calcifications among, but not of, the tissue of the pulp.
- (4) Interstitial calcifications of the tissues of the pulp.
- (5) Cylindrical calcifications of the pulp.
- (6) Osteo-dentin.

The author makes the statement that very frequently slight chronic affections of the pulp will cause the destruction of a portion of the layer of odontoblasts. In case a secondary deposit of dentin is formed in this region, it is devoid of tubuli or dentinal fibrillæ. Also, that under certain conditions these odontoblasts which have been lost may be regenerated.

In his conclusions Dr. Black says that all secondary calcific formations within the pulp result in exhaustion and final death of that organ. In view of this fact he decries the practice of stimulating secondary dentin and urges the use of non-conductive materials beneath all fillings which are in proximity to the pulp.

Eugene S. Talbot has reviewed the work which he has done upon the pathology of the pulp, in his book entitled "Developmental Pathology." Chap. xxviii of this work treats of the dental pulp and opens with a general statement as to its evolution and development. The author then considers the possibility of the existence of a lymphatic system in the pulp. He states that he has been unable to demonstrate the presence of lymphatics but describes oval spaces, without walls, in the pulp tissue, the nature of which is not clear. Whether there be lymphatics or not, the author is very certain that the pulp has a good regenerative process by which diseased and abscessed areas are repaired and restored to health.

**Pathology  
of the Pulp.**

After describing the vascular and nervous system of the pulp, Dr. Talbot takes up the consideration of its pathology. He states that the causes of pulp disease are changes in the blood stream which



are due to poisons circulating in the blood. These poisons are, in the opinion of the author, the result of degenerative conditions, and may produce in the pulp a faulty metabolism and auto-intoxication which make it susceptible to any of the pulp diseases. Such a pathological degeneration begins as soon as the apex of the root of the tooth is closed.

Because of its structure and physiology the pulp is very susceptible to inflammatory changes. According to the author, in case of obstruction, the intravascular pressure alone is sufficient to produce rupture of the capillaries and marked diapedesis. The absence of lymphatics and collateral circulation causes the pulp to pass quickly from hyperæmic states, through inflammation to death by coagulation, stagnation, neurosis or thrombosis.

In the consideration of pulp abscesses it is stated that they may occur at any location. A number of excellent micro-photographs are shown in which abscesses may be seen in their various stages, from that of areas of small cell infiltration to large abscesses and complete dissolution of tissue. The sections show degenerating odontoblasts and nerve fibres of thickened arteries. One particularly fortunate section, "Fig. 330, shows A, a circumscribed area of acute inflammation about to liquefy and form an abscess; C, a fully formed abscess, and B, the cicatricial tissue of an old abscess, showing conclusively that restoration of a diseased pulp is possible." These illustrations are followed by several showing nerve end degeneration with cases of specific Wallerian degeneration.

The author then takes up the discussion of the various pulp diseases and illustrates many with sections. He speaks of the pulp as being an end organ, without collateral circulation or lymphatics and having but a single exit for its venous circulations, all of which renders it susceptible to thrombosis. The thrombi are described as being due to the embolism of the products of degeneration, fat droplets, tissue fragments, tumor cells, air, etc.

Inflammation of the arterial coats is spoken of as being very common. He calls the pulp "a unique end organ whose arteries are susceptible to obliterans and arterio-schlerosi, which predispose to degeneration and necrosis." The causes of this condition are stated as being auto-intoxication, and drugs taken systemically which may become irritants, syphilis, gout, rheumatism, Bright's disease, alcoholism and metal poisons.

As a result of arterio-schlerosis in the pulp, cloudy swelling and fatty degenerations occur, which conditions are often associated with typhoid fever, septicæmia and other acute infections and toxic diseases. Amyloid and hyaline degeneration is described as well as the various calcific concretions which so readily form in degenerating pulp tissues.



## Items of Interest

In his conclusions Dr. Talbot states that the causes of pulp diseases are changes in the blood current due to circulating poisons which result from degenerative conditions occurring at the stress periods of life; that pathological degeneration of the pulp begins when it has ceased to form dentin and the apical end is nearly closed; that inflammatory processes of the pulp may pass through all stages from infection to abscess without pain; and that forms of degeneration, together with the pathological processes of evolution, are the direct cause of tooth decay.

Some very valuable contributions to our literature of the dental pulp have been made by Dr. Vida A. Latham. Of these there are two which deal with the pathology of that tissue, the first of which is an article entitled "Neoplasm of the Pulp," published in the *Journal of the American Medical Association* for 1904, p. 535. In this the author describes a case of tumor growth in the pulp of a tooth and shows a number of very beautiful slides made from micro-photographs of the diseased tissue.

After having reviewed the literature upon these growths, and having shown how little has been written upon this class of pulp diseases, the author describes the case in hand. The patient was an elderly woman, age fifty-six, stout build, neurotic type, who had two sisters die of cancer. She complained of a neuralgia about the right side of the face. There were but few teeth in the mouth, among which the right upper first premolar and cuspid alone showed any peculiarity. The former of these had a reddish color, while the cuspid was of a greenish-white tinge which made it very conspicuous. Both pulps were alive and there was no evidence of caries. The teeth were extracted and the pulps of each were examined. That of the cuspid had a firm, hard appearance, like that of a fibroid tumor, and was spongy to the touch like a myxoma.

In the sections made there were (1) evidences of granulation and pulpitis; (2) slight sclerosis; (3) slight hyaline degeneration; (4) vessels surrounded by a fibrous thickening; (5) many polynuclear cells scattered in the tissue and massed in areas like round cells, and hyaline areas near the periphery of the pulp.

In a discussion of these new tissue formations, Dr. Latham asserts that they were carcinomatous, of epithelial character. She offers no explanation of the origin of these epithelial cells, occurring as they did in a mesoblastic tissue. The statement is made that the odontoblasts are readily affected in pulpitis, they being found in every stage of degeneration. They are often exfoliated and atrophied like the ciliated cells of the bronchi. The author makes the suggestion that the epithelial origin of the cancer cells might easily be explained if we could but show that the odontoblasts were developed from the epithelium. The only

other possibility of epithelial anlage is that of the nerve tissue in the pulp.

Among the conclusions of the paper attention was called to the fact that there were no prominent symptoms in the case aside from a slight neuralgia; that neoplasms of the pulp are rare and the literature upon the subject very scarce; and that studies should be put upon these neoplasms with reference to their significance and the possibility of metastases.

In the second paper entitled "Some Pathological Features of the Pulp," which appeared in the *Journal of the American Medical Association* for 1906, p. 916, Dr. Latham has reviewed the inflammatory diseases of the pulp. In opening the discussion of the subject the author deplores the fact that the normal histology is not well understood and that the symptomology of the various pathological states of the pulp is not clear.

In the study of the inflammatory conditions of the pulp the following data are suggested for consideration (*a*) the delicate structure of the pulp is apt to undergo rapid secondary changes after an inflammatory attack, whether from constitutional or local causes; (*b*) its location and poor method of egress for exudations and dangers from compression; (*c*) fissures and lesions of dentine and enamel are not always able to recuperate for perfect repair; (*d*) if a pulp has been exposed it is difficult to disinfect and hermetically seal; (*e*) the liability of entrance of bacteria through cracks in the dentine even before the pulp has been exposed by decay; (*f*) abnormally large and irregular pulps in some teeth; (*g*) the absence of a lymphatic system in the pulp.

The article then takes up the etiology and symptomology of inflammation in general. The various infections are discussed in regard to their avenues of entrance to the tissues, and the resistance which is offered to them by the tissues. The avenues of entrance of irritation to the pulp are stated as follows: (1) by direct exposure as a sequel to caries, erosion, abrasion, fracture, etc.; (2) exposure of dentinal tubuli through trauma, fillings, etc., and transmission by the fibrils of irritating stimuli such as acids, metal fillings, etc., too close to the pulp; (3) through the apical foramina as a sympathetic depression from some other source; (4) by contact with the periodontal membrane when it is diseased.

In the discussion of the pathology of pulpitis the author shows sections of pulps in which slight irritation has given rise to a mild inflammation, which has subsequently been reduced by early resolution. Other sections are shown in which the inflammation has gone on to the formation of arterio-sclerosis and thrombosis, which condition is frequently associated with chronic inflammation of the periodontal membrane and pyorrhea. The author describes similar cases in which there is a marked

change in the odontoblastic layer which has been replaced by a thick membrane-like layer containing giant cells. Dr. Latham further states that these cells destroy portions of the pulpal wall of the dentin to enlarge the pulp chamber, and may later replace the lost tissue with a poor grade of dentin or osteo-dentin.

It is the belief of the essayist that a large number of inflamed and diseased pulps may recover if the cavities and the cracks in the teeth be sterilized and if the patient be in good health. As to the occurrence of pulpitis, it is stated that the upper premolars, cuspids and incisors are more susceptible than the corresponding lowers, but in the molars the lowers suffer more than the uppers.

In conclusion, the author says: "The loss of control of the vascular system of the pulp and obstruction in vessels followed by inflammation are probably factors in interstitial gingivitis which may be the cause of the gingivi losing their normal function and so aiding in the progress of the disease. The interference with the vascularity of the bone, the arteritis obliterans in the pulp and peridental membrane produce venous hyperæmia of the gums acute or interstitial, changes in the mucous glandular structure and, finally, atrophy and osteomalacia."

**Death of  
Pulps and  
Gold Crowns.**

Two papers have appeared which treat of the pathological conditions which result in living pulps beneath gold shell crowns and other large restorations. Both of these articles condemn the practice of leaving vital pulps beneath such extensive gold operations. The first paper, entitled "Pathological Lesions of the Living Pulp Under Gold Shell Crown," by M. L. Rhein, appeared in the *ITEMS OF INTEREST* for 1909, p. 561. In this paper Dr. Rhein calls attention to the pathological conditions which may be found in pulps under gold shell crowns, especially degenerations going on to calcification of the pulp. As an illustration he reports a case in which the pulp was removed from a tooth which had been crowned, and sections were made of the tissue thus obtained. The micro-photographs show a marked degeneration and a tendency to calcification throughout the pulp.

The second paper, a more comprehensive treatment of the subject, appeared in the *Dental Cosmos* for 1910, p. 389. It was entitled "The Adventitious Effect of Large Masses of Gold in Contact with Tooth Tissues," by I. N. Broomell. He first reports a case in which two pyorrhetic teeth which had served as bridge abutments were removed and an examination was made as to the condition of their pulps. In these are shown changes in the odontoblastic layer and an atrophy of the pulp cells. The blood vessels were enlarged and sclerotic, while the dentin

was largely disintegrated with the formation of interglobular spaces. All of these changes the author attributes to the adventitious effect of the mass of gold used for the attachment of the bridge to the tooth. The similarity between the sections of this case and the sections shown by Dr. Latham of pulp changes as the result of pyorrhea leads us to inquire as to how much of the pulp change in Dr. Broomell's case was due to the gold, and how much to the pyorrhetic condition of the teeth.

Other cases are cited by Dr. Broomell, in which a more specific effect of the irritation of gold is seen. In one case, suppuration of the pulp had been produced beneath a large gold filling. The dentinal fibres of this specimen showed club-shaped enlargements, and a large amount of calcific degeneration had taken place. Still another case was that of a woman about forty-five years of age, of highly nervous temperament, with teeth which were hypersensitive under normal conditions. A gold shell was placed on a lower bicuspid which was free from caries with but little cutting of the enamel. After setting the crown, an acute pulpitis resulted immediately, and it became so marked as to require the removal of the crown. The crown was reset after ten days and a little later the tooth was extracted because of pain. An examination of the pulp showed a marked increase in the number and size of the odontoblasts, and characteristic hyperæmia and acute inflammatory conditions of the pulp. It was evident to the author that "the disturbance in the pulp was due to the thermal influence of the gold casing upon the terminal branches of the dentinal fibres, notwithstanding the fact that they were shielded by a layer of normal enamel." He also states that one of the most probable sequelæ of crowning a tooth with a live pulp is that of dry gangrene. He cites a case in illustration of the view and shows sections of the pulp which have become shrunken and structureless.

In the *Dental Forum*, a journal published by the  
**Pulp Removal,** Dental Alumni Association of the University of  
**Waugh.** Buffalo, on p. 12, of Vol. I, an article is published by  
Dr. L. M. Waugh, entitled "Some Influences Which

Affect the Functions and Structure of the Dental Pulp." In this the author reviews the structure of the pulp and its pathology with especial reference to the calcific degenerations and their significance. In a discussion of the value of the pulp to the tooth, Dr. Waugh advocates the removal of the pulp in the following cases:

"(1) When decay has so progressed that all of the overlying dentin is decalcified, except in young subjects.

"(2) When prolonged pulpitis occurs beneath fillings of some years' standing. This seems especially true of gold.

"(3) When operative measures are necessary upon teeth, either much abraded or much eroded.

"(4) When much dentin has to be removed, in elongating or inclining teeth in preparation for shell gold crowns, especially metallic.

"(5) In treatment of advanced pyorrhea.

"(6) In facial neuralgia when associated with or superinduced by pulp degeneration."

**Secondary  
Calcifications of Pulp.  
Bunting.**

In an article entitled "Secondary Calcifications of the Tooth Pulp," which appeared in the *Dental Cosmos* for 1911, p. 157, the writer of this report reviewed the various forms of pulp calcifications and gave illustrations of each. In this article the author has shown that certain forms of calcification, which have been slowly laid down and of a good order, may be of service to the health and vitality of the tooth, while those calcifications which are formed rapidly in response to a severe irritation are of a poor order and are more of a menace than a boon. They interfere with the circulation of the pulp and tend to produce its degeneration and death. The article also calls attention to the severe irritation which is given to the pulp whenever a live tooth is covered with a gold shell crown. If the tooth be properly prepared for crowning, practically all of the enamel must be removed. The cutting of the dentin on the lateral surface of the tooth and the subsequent flowing of the cement over the cut surfaces produce a profound irritation upon the pulp through fibrillæ which have not undergone sclerotic changes. "The excessive stimulation to the pulp in a large number of such cases results in degeneration and death of that organ, so that, although occlusal or approximal fillings may be inserted relatively near to the pulp in teeth which have been affected by abrasion or slow caries, the operation of crowning these vital teeth is unsafe and hazardous in a large percentage of cases.

As a conclusion to a discussion of the value of the pulp to the tooth economy the following statement is made: "From the foregoing we may conclude that a healthy pulp is a valuable asset to the tooth which is to endure direct stress, such as mastication or the support of a filling. In teeth, however, which are ground down and entirely covered with crowns, little crushing stress is brought to bear upon the dentine, and the danger of fracture is reduced to minimum; in such cases the pulp is not essential to the welfare of the tooth, and may, therefore, be removed."

From the résumé which has been given it will be seen that relatively few American investigators have made a detailed and scientific study of pulp diseases. Much has been written of the symptomology and therapeutic treatment of the various forms of pulpitis, but it has been done from a subjective standpoint, dependent largely upon external and clini-

cal observations. Perhaps that form of inflammation which results in partial or total calcification of the pulp is best understood. This is due to the ease with which sections may be made of those hard concretions and to the abundance of material to be obtained for study.

As to the other forms of pulpitis which involve histological changes in the pulp tissue, but few have mastered the technic of its microscopy or have studied its diseases from a pathological standpoint. Although much valuable work has been done, there is need for further inquiry into the reaction of the pulp tissue in response to the various stimuli to which they are subjected. In these days of extreme and extensive tooth restoration, a large part of which is being done upon vital teeth, we should look into the effect which our large fillings, inlays and crowns have upon the pulp of the tooth. If their insertion is a source of severe and permanent irritation to the pulp, secondary changes will take place, many of which will result in cases of *tic douloureux*, septic pulps and apical abscesses.

We know that the pulp readily undergoes hyperæmic and inflammatory changes in response to irritation. We also know that when these irritations are mild and of short duration, the pulp may subsequently recover from the injury and return to normal. But in those cases in which the pulp has undergone more severe inflammatory and degenerative conditions, we are very uncertain as to our prognosis. Some believe that all pulps which are seriously affected will never recover their normal vitality and should be removed. Other claim that the pulp tissue has great powers of recuperation, and, if properly treated, does recover even in cases of marked pathological disturbance. We need then, a thorough and systematic study of the pulp degenerations and regenerations, which will be correlated and the irritations by which they are produced and the symptoms which accompany them. Such a study would give us information which we need, and should make our treatment of the pulp more intelligent and effective.





## Report on a Comparison of Inlays with Fillings.

By ZAHNARZT H. W. C. BÖDECKER, B.S., D.D.S., M.D.  
(Section III. *Sixth International Congress, London, 1914.*)

The subject that I am to present for discussion, "A comparison of Inlays with Fillings," is one upon which many writers have expressed opinions since the introduction of the inlay into dentistry. Even before this time, the question of relative merit of the various filling materials gave rise to many a heated controversy. Anyone glancing through the literature of this subject, past and present, will be struck by the fact that the advocates of any given filling material invariably aim to prove the superiority of this material by presenting patients in whose mouths fillings have lasted for a greater number of years. Such a method of appraising the relative value of different materials cannot, however, give correct results.

There are to-day, in Egypt, pyramids built of sun-dried brick. These bricks are still in as good a condition as they were, when made of the mud taken from the banks of the Nile, five thousand years ago. Is this a good and sufficient reason for advocating the use of mud bricks as a durable building material? On the other hand, the granite obelisks, which in Egypt had remained in a perfect state of preservation during thousands of years, after having been brought to Paris, London, and New York but a comparatively short time ago, show signs of superficial disintegration. Is this a good and sufficient reason for condemning the use of granite as a building material?

The difference in durability of these building materials is obviously explained by the difference in climatic conditions. If the influence of climatic upon building materials is so great, how much greater must be the effect of the various intra-oral conditions upon the different filling materials. Under the most favorable conditions, any filling made of a material that does not change in form after having been introduced into the cavity, and which has been finished with reasonable care, will certainly be durable. If, therefore, a patient is presented in whose teeth fillings have lasted twenty to thirty years, I maintain that this does not prove the superiority of this particular filling material, but that it only proves the intra-oral conditions to have been very favorable. In such cases the mouth is usually in a naturally hygienic condition, while the structure of the teeth is always remarkably sound.

In determining the comparative value of different fillings, the most important factors to be considered are those governing the intra-oral conditions. Of secondary importance I consider the question of æsthetic



effect, except for visible cavities; of time consumed in the introduction of the filling into the cavity, etc. By intra-oral conditions, I mean not only the force of the bite, but, what is of more importance, conditions favoring the predisposition or the immunity to primary and, therefore, also to secondary, caries. These conditions depend upon the chemical constitution of the saliva, upon the hygienic condition of the mouth, and upon the histological structure of the dental tissues. In comparing the different fillings, the questions arise: what effect have these conditions upon the various filling materials, and can the fillings in any way influence these conditions?

**The Saliva.** Upon the saliva no filling has any appreciable effect. The saliva does, however, affect some of the filling materials. With most of the metals it forms undesirably colored sulphur combinations. Yet this is of little importance when compared with the solvent action of the saliva on oxy-phosphate of zinc cement. Upon the exposed surface of a cement filling, the progress of solution is far more rapid at the center than at the margins of the cavity. This proves that in the inlay the seam of cement lies in the most favorable position. This seam of cement is the weakest point of the inlay; but theory and practice have both proved that it need never be the cause of failure.

Repeated examinations have shown that in places unexposed to the action of mastication the cement is dissolved only to a depth equal to the width of the seam. The explanation of this fact is, according to C. J. Grieves and others, that the mucus of the oral secretions forms a protective layer upon the cement. Some interesting investigations have been made upon this subject by J. Head. He found that a seam filled with Harvard cement, when placed in a 1 per cent. watery solution of lactic acid, dissolved out in two or three days. The same material, under the same circumstances, when placed in a 1 per cent. solution of lactic acid in saliva, showed no evidence of being attacked. Head also believes this to be due to the presence of the mucin in the saliva.

If the seam lies upon the occlusal surface the above mentioned rule does not apply, because the pumping action of mastication (Grieves), as well as the mechanical contact of the food, prevents the formation of a sufficiently thick layer of mucus. The only protection possible against the solution in this place is an almost theoretically perfect adaptation of the inlay to the cavity margin. As the endangered seams are those exposed to mastication, they are easily accessible and can, therefore, be burnished accurately against the margin of the cavity before setting the inlay.



Though the exposed surface of the seam of cement may be considered a disadvantage of the inlay, in the deeper parts the presence of the cement undoubtedly is of advantage. It intimately unites the inlay with the tooth, thereby hermetically sealing the cavity and obviating the danger of leakage. No other filling, oxyphosphate of zinc cement excepted, is so free from leakage as the porcelain or the gold inlay. Gutta-percha makes a notoriously leaky filling. Amalgam fillings, owing to the spheroidal tendency of this material, or due to improper manipulation, are occasionally found to be leaky. Even among large fillings made of gold-foil, a considerable number may be found that do not perfectly seal the cavity.

#### **Hygienic Conditions of the Mouth.**

Unhygienic conditions of the mouth are due either to personal uncleanness, or to the presence of places in which food particles are retained. Such conditions, being a predisposing cause of caries, will endanger any filling. While on the other hand, fillings cannot affect personal cleanliness, they can improve the hygienic conditions of the mouth by restoring the teeth to their normal form, thereby depriving the food-particles of their place of lodgment.

The office of a filling is to restore the form and the physiological function of the tooth. The restoration of form can be considered perfect only if the surface of the filling is absolutely smooth; the margins accurately adapted, and finished flush with the surface of the tooth; and the filling so contoured and provided with a contact point, that in connection with the adjoining tooth a self-cleansing space is formed.

The result of my observations is that in regard to smoothness of the surface, the inlays are the most perfect. The reason probably is that inlays can be so easily polished before being set into the cavity. Gold and amalgam fillings, owing to the fact that access to the approximal surfaces is often difficult, are not always as carefully polished as they should be. The surface of a gold filling may also become rough through exfoliation, if the foil has been insufficiently condensed.

Perfect marginal adaptation is most easily obtained with the plastic fillings, though in the case of amalgam this adaptation may not always be permanent. Gold or porcelain inlays and foil fillings require about an equal amount of skill. In inlays, however, marginal adaptation can be controlled before setting the inlay. With foil fillings this is possible only after the filling has been completed.

Whenever the margins of a filling are readily accessible, they can be easily finished flush with the surface of the tooth. The cervical margin, however, presents difficulties; so that numerous amalgam and, occasion-

ally, foil fillings are found that are imperfectly finished at this point. There is no excuse for inlays presenting margins elevated above the surface of the tooth; as at those places where the margin is not easily accessible, the inlay can, with reasonable care, be disked outside of the mouth.

Contours of gold foil and of amalgam are built up in the rough, by the aid of matrices. The finer lines of the tooth are reproduced in finishing the filling. In order to allow for the thickness of the matrix, and also for convenience in polishing, it is often necessary to use the separator. Fewer difficulties are encountered in contouring the inlay. The wax pattern for a gold inlay is more easily modelled in the mouth than a filling made of harder material. Porcelain, also, can be contoured more readily, as the work is done outside of the mouth. Owing to the fact that no matrix is used, and that the inlay is finished outside of the mouth, the separator is required only in very exceptional cases. Where the space formed by the moving away of the adjoining tooth is to be closed, the gold inlay, if suitably anchored, is the strongest and most easily contoured filling.

The contact point of a gold foil, or an amalgam filling carefully reproduced while finishing, is subsequently endangered in polishing. If accidentally destroyed, this point cannot be replaced without partially remaking the filling. Upon the gold inlay the contact point can be placed exactly where it is needed. After the wax pattern has been contoured, the exact position of the contact point is marked. If the sprue wire is attached to the pattern at this point, the sprue on the cast inlay can be so formed as to give an ideal contact point. This method has been used by the author since the introduction of casting. The consequences of destroying the contact point of a gold inlay while polishing are not serious, as it is always possible to repair the damage with a drop of solder.

The physiological function of the tooth can only be restored by reproducing the cusps and fissures upon the occlusal surface of the filling. As it is almost impossible to accomplish this with gold foil, large fillings of this kind usually present flat occlusal surfaces, with but very slight evidence of cusps. Well-modelled occlusal surfaces of amalgam fillings are more often met with, as this material is more easily carved. The most perfect occlusal surfaces, however, can be produced with the gold inlay. The cusps of the antagonist impress themselves in the wax pattern; but little skill in carving is therefore required to produce a filling whose cusps articulate exactly with those of the antagonist. As perfect mastication depends largely upon proper articulation, I consider the gold inlay to be the ideal filling for the restoration of the occlusal surfaces of the teeth.

**Histological  
Structure of  
Dental Tissues.**

Faulty structure of the dental tissues has no direct effect upon the filling. It is, however, to my mind, the most important predisposing cause of caries. On the other hand, the effect of various filling materials upon the dental tissues is so marked that it is surprising that more investigations along this line have not been made. A comparison of the effects of various filling materials upon the dentine was published years ago in "The Anatomy and Pathology of the Teeth," by C. F. W. Bödecker of New York. According to the researches of this author the following effects were observed:

(1) *Gutta-percha*. This never showed the slightest reaction at the border of the cavity in the dentine. The dentinal canaliculi and their tenants terminate abruptly toward the cavity.

(2) *Gold*. In some instances no reaction was noticeable in the dentine—in others there is a distinct reaction along the border—but it never is as marked as under oxyphosphate of zinc.

(3) *Oxyphosphate of Zinc*. The reaction is almost constantly present, and consists of a solidification of the dentine and an obliteration of a number of dentinal canaliculi. The consolidation is densest along the border of the cavity, where dentinal canaliculi are quite scanty; but the consolidated dentine extends to a considerable depth before it blends with normal dentine.

(4) *Amalgam*. The features that appear after the introduction depend upon the length of time the material is left in the cavity. A few months after its introduction a pronounced discoloration of the border of the cavity is almost invariably visible. This is due to the penetration of silver or mercuric sulphide into the dentinal canaliculi. Tin fillings behave similarly to amalgam, only in a less pronounced degree. After the lapse of several years the reaction of amalgam upon the adjacent dentine is quite marked.

Nothing is known about the reaction of the enamel under filling materials. However, owing to more recent investigations, the fact is becoming more generally recognized that this tissue does possess a certain amount of vitality. There is, therefore, most probably in the enamel, a reaction similar to that in the dentine; but owing to its much lower vitality, the reaction will be proportionally less marked. The cementum, also, when the cavity involves this tissue, shows signs of a reaction.

Under the inlay the reaction of the dentine is, if anything, more marked than under oxyphosphate of zinc cement. The greater amount of phosphoric acid in the thinly mixed cement probably acts as a more intense stimulant. The fact that cement hermetically seals the cavity,

thereby overcoming the danger of a leaky filling, and that it also changes normal dentine, easily destroyed by caries, into a tissue which has the appearance and the resistance of so-called senile dentine, is probably the reason why secondary caries hardly ever appears at the margin of a cavity filled with an inlay.

The reaction of the pulp, due to sudden thermal changes, is least marked under the porcelain inlay. The conductivity of a metallic inlay, owing to the insulating layer of cement, is much less than that of a gold or amalgam filling of the same size.

Further comparisons of inlays with fillings might be made, for example, upon the basis of æsthetic effect, or of time required to introduce the filling, or of relative value of different fillings in comparison to their cost. This question has, however, been so frequently discussed from these standpoints that comparisons along these lines need not be included in the report.

If asked which filling I consider to be the best, I would certainly answer: "The filling which, as the result of examining a very large number of patients from all classes of practice, is found to be perfect in the greatest percentage of cases. This, though being true, is hardly a practical answer. In fact, I do not believe it is possible to answer this question, except from the standpoint of the individual operator. The old maxim, "practice makes perfect," is applicable to the point in question. The operator, who, on account of the class of his patients, is forced to make a large number of amalgam fillings, will become proficient in the manipulation of this material, and will make the best fillings of this kind. His percentage of failures will be low—much lower than that of the operator who uses gold almost exclusively. The latter, as a rule, considers amalgam to be a second-class material, and ascribes his failures to the defects of this material rather than to his own lack of skill. The inlay being the newest filling, has suffered most in this respect. The contention, that it is easier to make a gold inlay than a foil filling, is based upon the misconception of the skill and patience necessary in making a perfect inlay.

In conclusion, I wish to state, briefly, under what conditions I, personally, favor the use of various fillings. In healthy adults with well calcified teeth, I use foil fillings in the small cavities upon the occlusal surfaces. In the teeth of young or constitutionally weak patients, I use the gold inlay upon the occlusal and approximal surfaces when a metallic filling is indicated. Rather than use amalgam in such cases, I have made inlays of pure silver. Not but that I have seen large amalgam fillings of which I should be proud of if I had made them, but success has



not always attended my efforts with this material. Porcelain I use in all visible cavities in the anterior teeth, except where these teeth have been extensively abraded by a strong bite. In such cases I prefer to use 22 kt. gold inlays. In very small cavities in the anterior teeth, instead of porcelain, I use silicate cement. The other cements, copper and zinc, need not be considered in this report.

If in comparing inlays with fillings my report seems biased in favor of the inlay, let my excuse be, that through long experience with this method of filling teeth, I have learned to value it, and that everything I have said in its favor is my firm conviction. With amalgam and foil fillings my success has not been so great as with gold inlays; in my case, therefore, the inlay is my best filling. Others may find the technique of foil filling, or of porcelain work more to their liking, and, consequently, will produce a greater number of perfect fillings by one or the other of these methods. Therefore, as we strive to give the greatest benefit to the greatest number, let each one, by choosing the method that is his best, do the best for his patients.

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## **Report on the Practice of Pressure Casting Compiled from the Recent American Literature.**

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By CLARENCE J. GRIEVES, M.D., of Baltimore, Md.  
*Section V. Sixth International Dental Congress, London, August, 1914.*

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"All true science begins with empiricism, although all science is science for the reason that it strives to pass out of the empirical stage."—HUXLEY.

The word "Practical" is defined as "relating or pertaining to action, practice, or use; derived from experience; capable of being used or turned to account; contributing to one's material advantage; possessing utility; opposed to Theoretical, speculative or ideal."—*Century Dictionary*.

Practical Knowledge is said to be the "knowledge the end of which is action."

So the practical side of the casting question is the knowledge gained from experience which ends in action; the production of, not words nor theories, but a casting which contributes to our material advantage and which can be applied with accuracy. In a broad sense, there can be nothing practical which is not intensely scientific, and successful practice is science applied to our work; but many methods are producing comfortable results, the reasons for which we do not know; in fact, the major portion of our practical actions is empirical; the reason or science for such action will have to be discovered later or remain undiscovered.

The scientific side of pressure casting is involved in another report, and where the science is known these reports interchange. Dividing this subject broadly into the operative and prosthetic fields, we must again

subdivide it into the direct and the indirect methods; the direct, which was practically the original method of dentistry, and the indirect, which consists in the interposition of an impression and cast of the field to be copied with many variations; after the wax pattern is obtained it is the same as the direct.

Of these methods, the consensus of opinion obtained from a study of the literature on the subject is decidedly with the direct method, which is that of Taggart, and will be described in his own words.

**Taggart's  
Methods.**

Whatever the discussion, still continued, as to methods of casting as applied to dentistry prior to its introduction by Taggart, pressure casting as applied to the whole field of dentistry has so completely revolutionized modern methods, and in the language of the definition has proven so capable of "contributing to one's material advantage," that all honor is due to W. H. Taggart, who, no matter what the court decisions as to priority of invention may be, was the first to bring it to our notice, and who deserves all the credit possible for its introduction.

This occurred at the anniversary meeting of the New York Odontological Society, June 15, 1907, in a paper entitled "A New and Accurate Method of Making Gold Inlays," *Dental Cosmos*, Nov., 1907.

This process, as described by Taggart, consisted in pressing into a properly prepared cavity a special wax which would burn from the mold without carbon residue; of carving this wax to contour and in occlusion; removing it by wire, which becomes the sprue, after investing (Peck's first used) and burning out; it was cast in pure gold at the boiling point in a special casting apparatus (using nitrous oxide and illuminating gas, known as Taggart casting machine). It is notable that besides inlays, crowns, bridge devices, and partial plates, cast in gold alloy clasp metal, were exhibited in the clinic.

"A Cast Gold Inlay": a Clinical Demonstration  
and Lecture, *Items of Interest*, Dec., 1907. Taggart,  
in this clinic, displayed four and five tooth bridges  
cast in one piece both against porcelain and by cementing on porcelain a  
full upper plate, and one with the Gilmore attachment.

In this paper Taggart's contention is thus summed up: "The actual time consumed in forcing the melted metal into the air-tight mold under the heavy pressure is probably but a fraction of a second, but the success of the whole process depends upon the speed."

Taggart describes the gold as being "a great number of degrees beyond this actual melting point. While it is in this freshly molded condition, the pressure is maintained for a few moments in order to allow the molten gold to thoroughly congeal. Either this continued pressure

prevents the gold from contracting or the amount of expansion in the hot mold is equal to it. At any rate, the filling fits."

He concludes: "I have kept pace with all former molding processes and find that by the time the metal is melted and poured into the mold by gravity it has become chilled enough to be thick and not in a thin liquid form necessary for a dental casting. My process takes advantage of every fraction of a second."

In this discussion Taggart accentuated principally the time-saving element of the direct method, but mentioned the indirect method, suggesting amalgam die, etc., for laboratory work.

"Technique of Making Inlays and of Investing  
**W. H. Taggart.** and Casting with the Taggart Casting Machine,"

ITEMS OF INTEREST, April, 1908. Improves his original technique by insisting on always having wax softened in water, steady temperature not above 138° F., sprue No. 16 wire (large as sprues now are), a measuring device for proper weight of water and investment, and improved technique in mixing and flasking.

Before proceeding further, the cardinal considerations of pressure casting must be mentioned if we are to intelligently review the literature. They are, beside the question of cavity preparation in inlay work and the correct preparation of the surface to be copied in other work, as follows:

(a) The type of wax used in the pattern, its condition and temperature when forced into and taken from the object copied and when invested.

(b) The investment, formulæ, mixing and refractory qualities, temperature when mixed, behavior when heated and cooled, etc.

(c) The various ideas as to drying and turning out the wax, of heating up and cooling investment.

(d) Casting in cold or hot mold.

(e) The metal: its purity and fluidity, its temperature and alloys, its contraction, etc.

(f) The machine and the way it applies its power, and the different types of power.

As an exponent of one type of indirect method  
**Van Woert.** applied to inlays, the articles of Dr. F. T. Van Woert, "The Technique of Inlay Making by the Direct and Indirect Methods," ITEMS OF INTEREST, 1913-14, are here condensed.

After describing these methods the author recommends Taggart's wax and his method of softening it, as well as carving and smoothing the wax form. His article is an argument favoring the indirect method, and he shows that a correct impression in cups original with the writer,



can be made by using Kerr's modelling compound, and models constructed of silver and tin amalgam. He makes the same claim for accurately copying a root for crowning; insists on small sprue, as a common pin, located at point of greater bulk of pattern; new gold for each casting, as it is seriously affected by every re-fusing. Models on articulator are not reliable for obtaining occlusion, and bite should be taken in Taggart's wax like the pattern in the direct method; this can be carved to occlusion and makes possible the carving of occlusal facets; favors casting in cool mold and believes large pieces are practical.

As an exponent of another indirect method applied to inlays may be mentioned Weston A. Price, whose reports are condensed herewith. His method consists in "taking an impression of cavity tooth walls; contiguous tissue and approximating contact, the making of a model from this impression in artificial stone and casting into invested model under very high pressure."

**W. A. Price.** "The Laws determining Casting or Fusing Results: their Control; and a New and Rational Technique,"

ITEMS OF INTEREST, May, 1908.

In his research, Price, by a very ingenious device and the casting of bars 1 in. in length in a fused quartz box, because of the shrinkage variation of investments, reports the expansion and contraction per linear inch of gold and its alloys. "The contraction here varied unduly as compared to the expansion; for example, pure gold cast under one pressure contracted eighteen-thousandths and under another pressure only fourteen-thousandths, and under another and very low pressure twenty-thousandths." He concludes: "If we are to get constant results we must use constant pressure, and to secure the least contraction we must have the pressure as high as possible without distorting the investment." He then explains the relation of the "actual effective pressure, which varies through enormous ranges with some casting investments; with gas or air it is equal to the cross section of the inlay or mold, not the gate or sprue, in fractions of a square inch divided into the pressure per square inch of the gas. . . . If the cross-section of the inlay is  $\frac{1}{8}$  in. square it will be  $\frac{1}{4}$  lb., less the back pressure, which finally reduces it to be less than  $\frac{1}{8}$  lb. actual pressure. . . . With the centrifugal machine the actual effective pressure is the weight of the mass of molten gold, multiplied by the square of the velocity of the gold in feet per second, divided by the radius of the circle it moves in, divided by 32 to change poundal into pounds pressure. . . . Half an ounce of gold revolving at ten revolutions per second, in a diameter of 10 ins., will produce 2.14 lbs. pressure on the inlay. With a casting machine giving  $1/100$  lb. actual pressure on the inlay the total contraction of pure gold will be about twenty-

## Items of Interest

thousandths, or 2 per cent.; with  $5/12$  lb. the contraction is thirteen-thousandths inch; this is one-third nearer perfect fit than the inlay made on  $1/100$ , amounting to a considerable factor in a long bridge."

Some investments expand and some contract, but none expand enough to correct the errors in contraction of the metal. Distortion of investment "will be small if the volume of the investment is large everywhere as compared with the size of the cavity or mold and heated evenly and slowly; . . . a large cast must not be made in a small investment cup."

"The Behavior of Gold in Fusing and Casting,"  
**W. H. Price.** *Dental Cosmos*, March, 1911. *Tests of Waxes.*

Wax pattern  $107^{\circ}$  F. in cavity chilled to  $67^{\circ}$  F. contracts 1.2 per cent.; this error is carried forward if invested at room temperature; if heated at time of investment to  $130^{\circ}$  F. it will expand 2.4 per cent. larger than when the pattern was in cavity. Price claims that this enlargement will not correct the error of gold contraction (which is 2 per cent.) because it is not uniform and because of the distortion produced by the elasticity of heated wax in cooling, and proves that working the wax produces unusual distortion. Two bars of gold cast under identical conditions from two patterns, the one of worked wax contracted 6.7 per cent. and the cast wax pattern expanded 2.7 per cent. From a long list of waxes tested, contraction ranged from 2.3 per cent. to 0.6 per cent., which is the minimum for any wax, the formula for which he gives herewith:

### PRICE'S WAX

Pure white gum.....	110	per cent.
“ tamarac .....	10	“
“ beeswax .....	15	“
“ paraffin .....	10	“
“ stearic acid .....	1	“

He says, however, "that all of the contraction errors can be controlled by reheating when investing (there agreeing with Van Horn) if the condition of the wax is not one of internal stress or stretch," and claims that elasticity "is always active when wax is cooled under stress," which is the case in nearly all inlay wax patterns, and he criticises the direct method of Taggart on these lines.

*The setting of all impression materials is shown to be a slight expansion of a fraction of 1 per cent. and is a negligible quantity. A very important element is the expansion and contraction of the investment material produced by burning out the wax pattern; he furnishes a very valuable table showing these changes and at what temperature the investment should be cast into, to secure maximum expansion of mold, to*

offset unavoidable contractions in metal, and shows the error of allowing the investment to cool after heating to dry out wax before casting it.

**Pressure of  
Melted Gold upon  
the Investment.**

He proves that "the strength of investing materials when entirely cold is much greater than when hot." A table showing the Price investment as standing best, calls attention to the fact that investment's coefficient of expansion is several hundred degrees less than that of the metal cap or ring carrying it, hence they do not sustain or support the investment.

After a thorough survey of his work (ITEMS OF INTEREST, May, 1908, review herewith), which was only taken to the sagging point of bars, he finds only 0.5 per cent. defect in contraction to correct as being as recorded, 2.20 per cent. linear as against 2.25 per cent.; hence 6.60 volume instead of 6.65. These figures are always a fixed error to which we must adapt our technique by producing some definite error elsewhere to neutralize them. This is best done by uniformly enlarging mold which is to receive it; in this he again agrees with Van Horn.

Price shows that if we cannot control contraction we can control its location and have it appear in the sprue by having gold molten in sprue, while inlay is crystallizing; in other words, a larger amount of gold in sprue in proportion to inlay, and a large gate; hot investment and high pressure. Eight ounces positive pressure on square surface  $\frac{1}{8}$  in., equivalent to 40 per cent. pressure, moves pure gold to only  $30^{\circ}$  F. below its melting point; 24 ozs. 120 lbs. pressure moves it to  $200^{\circ}$  F. below its melting point. These are very high pressures (see references about loss of pressure), and can only be used in strong investments, such as "Artificial Stone," which is a silicate cement originated by him—formula herewith:

**PRICE'S ARTIFICIAL STONE**

Pure Silica .....	20 parts.
Calcium hydrate .....	19 "
Aluminium oxide .....	42 "

Price claims that artificial stone is so strong that the cooling gold cannot crush it, but will itself be stretched. Gold cast into it with blow-pipes drops out; with low pressure it falls loose; with high pressure it becomes necessary to split investment. The same is true, he claims, of rings cast to fit mandrel.

**W. H. Price.**

"Casting to Models, its Advantages and Technique," ITEMS OF INTEREST, Sept., 1910. Price's method admits that gold contracts 2 per cent. or one-fiftieth of its dimensions in all directions; that a dental joint cannot be made by any of the present methods closer than  $\frac{1}{1,000}$  in., while it

should be  $1/10,000$ ; hence he suggests that the cavo-surface angle be bevelled in all directions and then closed by burnishing, while the inlay is setting. He opposes casting direct to porcelain, but believes in the great advantage of artificial stone in casting large pieces or copies because of no contraction; also crown and bridges, both in section and grouped dummies; partial and full plates, can also be cast with little contraction.

Having briefly outlined the two types of indirect methods and produced the arguments of their prominent supporters, we turn again to some reasons why the direct method should be used as given by Ward.

"A Consideration of the Casting Process, with  
special reference to Refractory Material," *Dental Cosmos*, Sept., 1909. Dr. Ward reviews the three articles of W. A. Price, quoted, but does not agree that "an artificial stone" model, which expands sufficiently to counteract the shrinkage of the gold and high pressure in casting, is necessary, nor will it correct the evil, saying his methods are not the only ones pursued by engineers in such work.

Ward disagrees first. While he grants the shrinkage of gold as liberal as deduced by Price, 2 per cent., he claims that this was for bars, and takes the wheel as more typical of the inlay, stating from tables given that while an iron wheel 10 ft. in diameter had a linear shrinkage of 1.08 in. per ft., one 2 ft. in diameter shrank only 0.115 in. per ft., so that castings of iron  $\frac{1}{4}$  in. in diameter only shrink 0.0004 in. Accepting Price's determination for gold at 2 per cent., which is twice that of cast iron, he says: "We can only calculate a shrinkage of 0.0008 in. for pure gold; seated in the center of the cavity this leaves 0.0004 in. of cement in each side." He further explains that "it is not necessary to counteract the shrinkage of gold in casting by high pressures and artificial stone models." Shrinkage "can be prevented beyond the limit of human errors in other parts of the technique if we cast into a dry cool mold;" necessary to have the gold as fluid as possible, but not boiling; the mold as cool as possible and cast quickly (making an oxyhydrogen blow-pipe absolutely necessary). (Note that this is confirmatory of Dr. Taggart's original recommendation.)

Ward emphasizes not only purity of gold and of alloys of gold and platinum, but insists that repeated heating produces sluggishness and destroys fluidity, no matter how pure the metal.

He states that ferric-oxide, a common impurity  
of silex, in an investment destroys the color and  
fluidity and raises the melting point of all pure  
metals. He goes very thoroughly into the refractory substance both

chemically and physically unused in investments, and emphasizes the value of the well-known expansion of silica to counteract the contraction of plaster and insists that the size of the flint is also important, giving the following formula for dental concrete:

No. 200 Flint .....	30 cc.
XXX Silica .....	36 "
Plaster of Paris .....	17 "

(Flint should be increased in coarseness for large pieces.)

Ward reports a study of the pressure on different investments on the market, concluding that the fine ones, after heating, will scarcely hold together while being placed in the dynamometer; the coarse ones are stronger, though less uniform in change.

He emphasizes the importance of definite pressure in casting which can be maintained, and says of this formula for investment that "if these plans are carefully carried out the movement appears to be practically nothing, the expansion of the silica counteracting the shrinkage of the plaster."

**Van Horn.** A vigorous defender of the direct method is found in C. K. Van Horn, whose method ("Concerning Casting Methods and Casting Services,"

*Dental Cosmos*, June, 1911) consists in making a wax pattern in the tooth cavity, expanding the pattern by having the investing material and flask at a temperature sufficiently above the normal body temperature when this pattern is invested to compensate for shrinkage of the gold, which is in excess of the expansion of investment.

"Four Casting Failures and Remedies," *Dental Cosmos*, Aug., 1912. Van Horn sharply disagrees with Price on a number of points, and particularly objects to his cavity preparation, which anticipates long bevelled edges or laps in the inlay which have to be modified and burnished in cavo-surface angle adaptation, claiming that it stretches and hardens the gold; that the cement line will come up under occlusal stress, and with him and F. G. Lane, Van Woert agrees.

**Van Horn.** "Casting: A Review and Commentary, including a Technique which makes possible a Casting of the same Size as the Wax Patterns at Body Temperature," *Dental Cosmos*, 1910. He favors the direct method because, first, as he points out, "A cylinder of pattern wax approximately 3/16 by 1/2 in. when passing from normal body temperature (98.6/10) to temperature of the water with which we ordinarily mix our investment (54-56° F.), will shorten some 0.001/4 in., and the same rule he insists applies to impression compounds, or wax methods, such as Price's, hence the impression in Price's should be expanded as he (Price) recom-



mends the expansion of the wax pattern. As to casting apparatus, knows of none on the market which will give a cold mold at the moment of casting, nor of one which will allow 300-600 lbs. pressure per square inch; considers it useless to so theorize, and says that while no machine is perfect, the vacuum method is the most tractable.

"The Wax Pattern: A Technique together with Appliances, etc., for its Execution," *Dental Cosmos*, Sept., 1912. Van Horn introduces a series of wax patterns, forms which approximate the cavity formation. He says: "The scientific consideration involved is that pattern wax is very susceptible to physical effects of heat, and that advantage is taken of the difference in the coefficient of expansion of the wax and that of investing material under the same thermal influence."

His argument against the Price artificial stone method is that at its highest efficiency it still leaves, as Price admits, so much shrinkage that the cavo-surface angle has to be chisel-bevelled, as does the filling, and the area of leakage has to be closed by burnishing.

"Standardizing and Investing Process and Simplifying and Casting Process," *Dental Cosmos*, Oct., 1911. Van Horn agrees with J. G. Lane that it is anatomically impossible "to take an accurate impression of the interior of an approximo-occlusal cavity, the exterior of tooth involved, the contiguous tissues and a part of the approximate tooth without distortion, unless the tooth walls be sacrificed in cavity preparation." He further argues: "Then add to this the further uncertainty of perfectly reproducing the parts in the model and of casting in the invested model under the exceeding high pressure of 300-600 lbs. per square inch, without distorting the investing material which envelops the model." Van Horn has certain hard wax forms which he presses into the cavity; removes and covers them with liquid wax kept melted in a special device (the wax softener); this to a degree compensates for the defects and gives good results by the direct method. He emphasizes again the statement that "it is absurd to assume that a casting fitting the cavity perfectly will result by following any process which does not provide a means of controlling and determining with accuracy the temperature at which the wax pattern is invested. . . . Wax pattern should never be subjected to cold water in the cavity, but always to warm water. ("Some Phases of the Casting Process," *Dental Cosmos*, May, 1909.)

His conclusion is "no process, no material, and no device has yet been evolved which would produce two gold castings of the same size for the same cavity unless those patterns were invested at the same temperature."

He does not recommend casting against porcelain, but says it can be

done, and submits specimens, provided investment be hot enough; he agrees that the field is limited.

"Casting; a Retrospect," *Digest*, vol. xv, page 436, favors the *direct method* because of "only three transfers, *i. e.*, cavity to pattern, pattern to investment, investment to gold." Objects to *indirect method* because of five transfers, *i. e.*, cavity to impression, impression to model, model to pattern, pattern to investment, investment to gold; also argues that there are four transfers by the "artificial stone" method, thus introducing error. Objects to impression methods because of distortion produced by attempting to obtain not only interior of cavity, but the exterior and that of adjoining teeth. Disagrees with Ward that flask should be just so cool as to be handled; this will do for small, but for compound fillings flask should be as hot as possible, saying that "the lower the temperature of the flask the greater the shrinkage, and that the approximate amount of shrinkage desired shall determine the reduction of temperature in the flask at times of casting." Does not agree with Baker's figures (*Dental Review*, pages 130-131) regarding expansion of investment in iron and brass rings and Pecks' compound at different heats, saying: "On the Taggart and Jamison machines with brass rings it is possible to get a casting almost the size of the flaked pattern, but absolutely no larger."

**Investment Material.** Investment material, says Lane, should expand sufficiently to follow up the expansion of the brass flask which contains it. This will stand 45 lbs. per square inch (Results of Experiments, *Pacific Gazette*, vol. xvi, page 586). This investment showed best results.

#### BY WEIGHT

Cast plaster ..... 1 part.  
Powd. silex ..... 2 parts.

#### CASTINGS MADE WITH THIS INVESTMENT COMPARED

Compared with Pecks..... 83/100 of 1 per cent.  
" " W. S. White's..... 18/100 " 1 " "  
" " Lane's formula ..... 16/100 " 1 " "

The above were made in hot molds and again in molds with same technique and investment, and then allowed to cool so they could be held in the hand with a loss of 1.64 per cent. by shrinkage in plaster and silica casting pressure above 25 lbs. air per square inch.

**Why Pressure is Needed During Casting.** Lane says (*Dental Digest*, vol. xv, page 98): "The only reason why any pressure is needed is that the molecular attraction that holds the mass of matter, gold, in globular or spheroidal form is greater than the force of gravity, and the gold there-

fore will not by force of gravity flow down on mold without assistance" (*see* experiments). Great objection to Price's method; distortion due to tooth contour in removing large impressions, and "for all practical purposes it is a geometrical impossibility to distort the mold should shrinkage of investment occur."

"Investments for Casting Molds," *Digest*, 1911.

**J. G. Lane.** Plaster making up a heavy percentage of all investments always "turns smaller"; he says, "a simple ocular test for any investment is, if a line of space occur on heating, between investment and flask that is sufficient cause to cast aside such investment."

Herewith tests of investments. Flasks all red hot.

Tests of L. D. Caulk investment,	
loss per cent. ....	.14 of 1 per cent.
S. S. White. ....	.18 " 1 " "
I. D. L. ....	.56 " 1 " "
Standard ....	.60 " 1 " "
Consolidated ....	.84 " 1 " "
Peck's ....	.86 " 1 " "
Terra plastica ....	1.28 " 1 " "

He says: "It will be observed that this method of testing follows exactly the line of technique that we follow in our regular work, and the findings are not merely statements of measurements and figures, but are statements of facts as they attain in our daily practice."

The highest measurement records a loss of approximately one-seventh of 1 per cent. by shrinkage; the investment compound represented in this particular test shows no trace of a line of space between the flask and its contents when heated to redness: the investment expanded as much as the flask which contained it." As a second test, all flasks allowed to cool down to room temperature, flasks lukewarm; temperature exposed to oxyhydrogen flame for only twenty seconds, with the result that contraction was vastly greater then with hot flasks.

#### RESULTS HEREWITH

L. D. Caulk, loss per cent. ....	.88 of 1 per cent.
S. S. White ....	.92 " 1 " "
I. D. L. ....	1.30 per cent.
Standard ....	1.34 " "
Consolidated ....	1.68 " "
Peck's ....	1.60 " "
Terra plastica ....	1.95 " "

Hence Lane declares that "the importance of casting in a hot mold cannot be overestimated," and insists that "a hot mold is stronger than



one that has been heated and allowed to cool." Lane recommends, finally: "If it is necessary to have a casting with an absolute zero measurement (or greater than that) expand the pattern by flasking it in a warm investment, according to the technique of Van Horn."

In the discussion of Lane's paper ("Manual of Casting," page 10) his attitude toward the artificial stone process is well outlined as follows:

**Lane's Views  
on Artificial  
Stone.**

"While we must admit that Dr. Price has worked out a beautiful technique in theory, yet we have not been able to obtain from his writings, and we believe we have read most or all of them, certain data, or technique, that must of necessity belong, in order that his technique may obtain as he claims for it. This data is the temperature that the mold must have at the moment of casting and a means of determining that temperature. Dr. Price has ingeniously devised an artificial stone that has a permanent expansion equal to the normal expansion of gold up to its fusing point. Granting this equalization, then any rise in temperature in the flask at the moment of casting means an increase in the size of the casting over and above zero measurement. In order to roughly demonstrate to you the effect of variation of temperature in the flask at the moment of casting, we have here a small mandrel on which are two gold rings. The mandrel has a taper of one degree. The patterns for the ring shown here were made at exactly the same point on the mandrel. Both were invested in the investment material that we have advocated, and from the same mix or bowl of batter. There could, therefore, be no possible difference in physical conditions thus far. One ring was cast in a mold as hot as the fusing point of the brass flask which contained it would allow, and the other cast in a flask that was cool enough to handle with the fingers at the moment of casting. You will notice that one ring drops to within the tiniest line of the point where the patterns were made, and the other ring stops about  $\frac{3}{8}$  in. further up. Therefore, in order to make a given technique, complete data for the temperature of the flask at the moment of casting should be given.

"The figures given us by Dr. Lodge—giving the effect of pressure as determined by Dr. Price—are in error. Dr. Price obtained these figures by experimenting in casting with a centrifugal machine."

"In the same article, in the *ITEMS OF INTEREST*, wherein Dr. Price gives us these figures, he states that "in computing pressure in such a machine the entire mass of gold in the crucible is available and must be reckoned in computing the pressure on the sprue area. This is unquestionably an error. An inflexible law of physics teaches us that the only bulk of gold available for pressure and computation under such condi-

## Items of Interest

tions is a bulk equal to the area of the narrowest part of the sprue opening, and the length of which is the height of gold in the crucible. All the remaining bulk of gold that fills the rest of the funnel-shaped crucible adds absolutely nothing to the pressure on the actual sprue area. Therefore all the figures that are based on this theory and method of computation are certainly in error."

From J. G. Lane, "The Casting Process as Applied to Inlays of Gold and other Dental Uses," *Dental Digest*, July, Aug., Sept., 1909, we make the following notes:

**Lane.**

1. Does not favor casting on porcelain.
2. Casts gold bases for loose pin crown.
3. In bridge work, waxing up dummy to long pin facing or saddle back tooth, removing and filling holes with graphite.
4. Opposes casting, even small bridges as a whole, on account of shrinkage.
5. Recommends casting part of pyorrhœa splints.
6. Recommends casting pure aluminium as a full plate base and claims disintegration of the early work was due to impure metal; says aluminium may be cast directly against teeth if not encircled by wax. Partial plate may be cast in gold.

You are referred to the article of L. W. Strycker, "Ancient Origin of Dental Casting" (*Manual of Casting*, page 5) for valuable historical data relative to pressure casting, and we quote him as follows:

**Strycker.**

L. W. Strycker ("Investments for Casting Molds," *Digest*, March, 1911) claims that an investment which expands outwardly will distort the mold inwardly and does not agree with Lane. Strycker insists that the micrometer test is useless in measuring inlays, saying it is not possible to make castings smooth enough to make measurements of any value in determining shrinkage. Emphasizing the importance of the location of the wax pattern in the casting ring, he says: "In vacuum casting the wax form is placed nearer the bottom of the ring; in pressure casting nearer the top." He concludes: "As the investment material is increased in amount the expansion will be uneven, and it will be greatest in the direction of the least resistance according to the length of the material involved."

**Investments.**

**L. E. Custer.**

"Some Practical Points on Inlays." *Manual of Casting*, page 62. Objects to silex because of lack of smooth surfaces; suggests plaster of Paris, 1 part; fire clay (highly calcined), 4 parts. This fire clay will not shrink because it has been burned at a much higher heat than that of casting. 1 cubic in. at red heat will shrink 1/1,000 in.

Shrinkage of inlay mold will then be one-fifth of 1/1,000, or too little to worry about.

"Mold should be dried and highly heated at time of casting; when casting in hot mold it is not necessary to have gold so hot."

Necessary to have the same pressure on gold in casting each time; best done on compressed air, gas, or steam machine; it is better to have enough gold to seal edges, preventing back air leaks.

In centrifugal machine have only enough to make a perfect casting and little excess, for "the mold is distorted by too great a head of metal or too high centrifugal speed. In this Custer disagrees with many.

*Dental Summary*, Jan., 1911, "A Consideration of the Shrinkage of the Investment: "Investing the Wax Model so as to secure Minimum Possibility of Distortion." Explains that the lateral expansion of the inner walls of the mold takes place, and says: "Therefore the lateral expansion would be of an unequal and varying degree throughout the ring, registering the same degree of irregularity upon the inner circumference of the ring. Hence the inner circumference would no longer maintain the lines of a perfect circle, and the ring would be described as having become warped and the inner circumference distorted," and he displays a number of diagrams and specimens establishing these facts.

In speaking of the *expansion of metals*, C. J. Clark, "A Theoretic Consideration of the Expansion and Contraction of Gold when Cast under Pressure," *Manual of Casting*, page 9, claims a vast difference between expansion of gold in crucible and that forced and held in mold by air pressure. Relative specific gravity of gold is 19.16 and casting under pressure is combination of hydraulic pressure and welding, which develops a higher specific gravity than in ordinary cooling, thus 12 lbs. pressure of expanding gas will develop a density or specific gravity of 19.45. "There is no inherent force or physical property in the metal itself after being cast under pressure capable of augmenting its density to any further degree, so it is physically impossible for it to shrink. . . . Therefore, the discrepancy must be ascribed to some other factor or cause than the shrinkage of gold."

For an excellent analysis of the various machines and the methods of applying force you are referred to C. J. Clark's "An Analysis of the various Methods and Devices Used to Cast Metal under Pressure," *Dental Review*, Aug., 1908. He objects to the machines using compound air or gas as follows:

**Gas Pressure  
Machines.**

- "1. The expanding gas chills the metal.
- "2. The force employed is not restricted to expend its efforts where they would be most effective.
- "3. No vent for free expulsion of the confined air.



"4. Only the minimum amount of the pressure expended is utilized: the major portion of the pressure being wasted in being applied where it is a positive detriment to the efficiency of the machine."

**Advantages of  
Vacuum Machines**

"1. The metal is not chilled by expanding gas, but to the contrary, heat can be applied until the mold is completely filled.

"2. The confined air in the mold is drawn into the vacuum chamber before the metal is forced into the mold."

He concludes that centrifugal force is the best because

**Centrifugal  
Force.**

"1. No expanding gas to chill the molten metal.

"2. No pressure penetrating the investment enveloping the metal and assisting it to shrink.

"3. The air confined in the mold and gate is allowed to escape into the surrounding investment unhampered by any opposing force.

"4. It requires no expensive or complicated machine or operation."

**Steam  
Force.**

His objection to steam is that force is only momentary. He says: "When a wet pad is suddenly brought down upon a heated flask and over glowing metal steam is generated, a sudden spasmodic pressure is developed, but only for the instant, for as soon as the maximum heat has subsided, the pressure immediately diminishes, and as this occurs a vacuum is formed and the pressure on the molten metal is nil."

As bearing on the foregoing, we quote Kabell (ITEMS OF INTEREST, May, 1909. Reports a series of tests): "To show that the location of contraction was not affected by any pressure on the sprue and investment differently between 3 and 25 lbs."

W. A. Price questions this statement (*see* his articles).

"Technique of Casting," Feb., 1914, *Summary*.

**C. P. Hinman.**

Gives the result of his long study of waxes, saying that the best wax consists of white wax, paraffin, and stearine; with the following properties. Wax gives plasticity, paraffin gives firmness, and stearine gives carving qualities. This should be very carefully annealed in hot water after it is made; this is very important. He advocates weighing investment and water, and states that in heating investment, changes in crystallization take place in the plaster (the base for all investments) about one hour after mixing, and that they can be stopped by heat; therefore the drying out should begin before the expiration of that hour. After burning out wax, allow flask to cool so as to cast in cool mold, otherwise inlay will be too large; from 3 to 5 lbs. pressure for casting, according to size, kept up three minutes after casting;

use 24-carat gold usually and for contours 24-carat with 3 per cent. platinum.

We quote a valuable and practical procedure for control of shrinkage of both wax and investment in M.O.D. cavities recently reported by T. P. Hinman ("Technique of some Problems in Casting," Pennsylvania Society, July, 1914).

He states that it is applicable to all cavities involving three surfaces. By the indirect method a matrix of 3/1,000 pure gold is burnished and swaged with enough lap to protect the cavo-surfaces, investments and margins from breaking down, caused by molten metal being driven against it. This matrix is filled with cast wax, preventing errors of elasticity. These should be cast cool: they never need cavo-surface trimming, can be cast in any alloy, giving a pure gold margin.

"Remarks on Casting," *Dental Brief, Manual*,  
**Robert Le Cron.** page 221). In prosthesis emphasizes the importance of the size of the sprue as small and multiple for gold; any reasonable size for light metals and aluminium; and still smaller for heavy metals as tin and Watts' metal.

This article is a most valuable contribution on vents and air cushion in casting large pieces.

He suggests perforating investment at distant points with fine broach and then sealing the flask end of perforation with a little soft investment; this holds the air cushion within and prevents heavy metals from running clear through; he emphasizes the fusing point of metal, saying "there is a certain condition of a molten metal at which that respective metal will cast to the best advantage and it is not the boiling point." The dangers of over-heating and of carbon flame are also mentioned. Claims that thin castings covering large surfaces can be made of gold following the rule (excepting Watts' and similar metals); "the heavier and greater the bulk of metal, and the thinner the object to be cast, the smaller the sprue opening and the greater the number of sprues radiating from a common center to various parts of the mold; and last, but by no means least, the flatter the crucible or surface upon which the metal is melted. . . . With small work the porosity of the investment should be quite sufficient (as a vent); by small is meant inlays, crowns, bridges, or any design within a radius of  $2\frac{1}{2}$  ins."

**Cast  
Dentures.**

There is a great divergence of opinion on pressure casting of base plates, many claiming that it is practised in gold and its alloys in partial dentures, and all are of the opinion that full plates are practical when cast in pure aluminium.



Among the first to accomplish such castings were Bear and Zeller, and it is interesting to quote C. C. Carroll, who practised pressure casting of aluminium 1885-1886, to the effect to "maintain the pressure about five seconds to give the molecules of metal time to arrange themselves under pressure; otherwise there may be small pits over the surface of the denture."

**R. C. Brophy.** "The Scope of Casting in Dentistry," *Manual*, page 115. Practised successfully seventeen years, casting of full bases for dentures in alloys of aluminium, but says it is not practical to cast full bases in gold; approves and practises horseshoe partial or saddle plates.

**Robert Seymour.** "The Cast Aluminium Plate," *Manual*, page 131. Describes model made of silex coarser than for investment; 3 parts of silex to 1 of plaster; waxed up in Tenax wax; three gate ways; sprue of No. 10 wire or short wax, and a special separating flask allows removal of wax without too much heating; plunger machine with moist asbestos film for casting with gentle but firm pressure, vulcanite attachment for teeth.

**D. D. Campbell.** "Campbell's Cow Bell Method of Casting," *Dental Summary*, Dec., 1912, for casting aluminium bases, recommends C. C. Allen's investment (equal parts Portland cement and dental plaster), casting done by tipping cow bell on the flask in which investment is made; spaces must be left between teeth if metal is cast direct to them. After casting base, it is set on die and swaged, adding accuracy.

**Harpel and Olds.** "Plate Casting by Vacuum Process," *Manual*, page 225. For constructing full upper and lower base, vulcanite attachment, models made of good investment compound coated with graphite to give smooth surface on cast; four wax gates leading to wooden sprue at heel of wax plate, which should be formed and carved with rim and retention lugs just as needed. Blowpipe flame not directly on metal; cast when fluid; flask hot.

**G. F. Wilson.** "Wilson's Cast Aluminium Plates," *Dental Summary*, Dec., 1911. Models made of wash silica and plaster of Paris, equal parts by measure. Teeth waxed up with beeswax on paraffin base plate; diameter of pouring sprue, 3/16 inch; two gates at heel of plate; casting done in Billmayer bucket; cast aluminium not practical applied to platinum pin teeth because aluminium is a solvent of platinum.

There is a divergence of opinion on practicability of casting splints in bulk because the gold does not burnish well on the edges; more agree with casting against backings or abutment fillings or crowns.

**Chayes.** The various articles of Herman Chayes (ITEMS OF INTEREST, Feb., 1911 and 1912), "Telescope Crown," etc., describe ingenious casting idea and wonderful mechanism and casting results; also see the methods of Charles Ash (*Dental Summary*, 1913).

Herman Chayes is in favor of direct method; says alloys for inlays should be 5 per cent. platinum and pure gold. Believes in cast saddles, cast on direct line with the sprue and not at right angles to the section; thinks dummies should be cast and then assembled and soldered.

**Goslee.** As one of the original and most prominent exponents of the practice of pressure casting applied to crown and bridgework, H. J. Goslee's numerous articles in ITEMS OF INTEREST might be quoted were there time. We paraphrase from two:

(a) "The Extent to which the Casting Process may be Advantageously Applied to Crown and Bridgework," *Dental Summary*.

(b) "Removable Bridgework," *Dental Review*, 1912.

Davis crowns and Goslee. Teeth are stronger when cemented in than when soldered in or cast; he says the color is better and is opposed to direct casting upon porcelain.

Bridges; fixed copes made by casting against 36 gauge pure gold swaged to amalgam die of root end.

Gold crowns; (little contour) suggests that cusps be cast into 28 gauge 22 carats gold band, fitted and contoured; (extensive contours) narrow band of 22 carat or platinum 30-32 gauge fitted cervically, then gold cast upon that.

Making dummies; casting separately preferred; when cast in section must never be over three or four.

Backings for Goslee teeth 24 carat, 38 gauge, are always best swaged to porcelain tooth first, before casting, to insure accuracy.

Facings used same way; contour and narrow saddles for cleanliness. Recommends uniting dummies by 22 k. solder, as against practice of casting in 5 per cent. platinum gold alloy and uniting with pure gold.

**Removable Bridges.** Opposed to casting of clasps because casting weakens and destroys resilience; much better made of rolled or drawn metal. Recommends Roach, Morgan, and Gilmore attachments and notes the great possibilities in casting for forming the body of the fixture, saying: "The successful casting of large pieces means development of proper technique." High-grade investment and strong properly stiffened wax forms. In this way, he says: "All forms and sizes of saddles may be cast and coin gold is especially adapted, because it is sufficiently strong and accurate."

## Items of Interest

### **Casting Against Porcelain.**

The subject of casting directly on porcelain is open to debate, and few can be found who believe it practical.

"Porcelain Crown with Cast Gold Bar,"  
**W. H. Sanderson.** *Manual*, page 14. When investing, add extra wire opposite sprue, which is withdrawn with sprue to allow escape of gas or air; this allows casting to thin edges on porcelain.

### **Precautions.**

There must be no excess wax nor overlap on porcelain and investment should be heated as high as possible.

### **W. E. Gillespie.**

"Casting, with special reference to Casting on Porcelain," *Manual*, page 217. Claims that porcelain is never checked by casting directly to it without backing; metals used 24-22-carat gold, no flux necessary. The ring, investment, and porcelain in the mold should be at a red heat; emphasizes the importance of careful waxing and investing.

The following men claim to cast on porcelain successfully: E. M. Carson, St. Louis, "Clinic on Cast Crown," *Cos.*, April, 1912; A. J. Bush, "The Cast Inlay and its Advantages," *Summary*, Feb., 1914, who prefers cold to hot mold and metal white hot and 24-carat gold.

Herewith a few other well-known authorities who claim it is practical:

Crandal, *Manual*, page 107;

Cunningham, "Casting Gold on Porcelain," page 120;

W. H. Hayden, "Casting Large Bridges," page 126.

A conservative majority, however, are opposed to casting direct to porcelain, as illustrated by Thomas E. Weeks ("The Possibilities of the Casting Process in the Use of the Various Manufactured Porcelains in Crown and Bridgework," *Brief*, June, 1911), who is opposed to casting on porcelain, and suggests to cast dummies individually; cementing on porcelain later, and uses platinum wire where casting has extra stress.

Any number of articles might be quoted relative to the various applications of the cast-metal base for molars, bicuspid, canines, incisors; the work of Goslee has been quoted. A few others are:

### CAST METAL BASE; PORCELAIN CEMENTED ON.

Schlegel, G. S. "An Ideal Bicuspid or Molar Crown," *Manual*, p. 1110.

Burris, C. J. "Cast-Jointed Logan Crown," *Manual*, p. 80.

Lyon, C. J. "Jackson's Method," *Dental Review*, 1913.

Haslett, F. W. *Dental Summary*, Jan., 1912.



- Hutchinson, T. C. "Making a Richmond Crown without Use of Solder," *Manual*, p. 129.
- Thompson, J. M. "Description of an Interesting Case, Restored by all Porcelain Bridge and Bridges upon Cast Bases," *Manual of Casting*, p. 157.
- Stallman, C. E. "A New Attachment for Abutments in Bridgework and Porcelain Crown, etc.," *ITEMS OF INTEREST*, April, 1911.

**Metals  
for Cast Work.**

The metals used in pressure casting and their alloys. All expert operators unite in opposing the use of scrap gold for any sort of pressure casting, and a majority are for pure gold for inlays, as C. O. Simpson ("Making the Most of the Casting Question," June, 1913). Many agree with Gillette (*Dental Summary*) that platinum and gold  $2\frac{1}{2}$  per cent. is the best for stress areas.

Others think with C. N. Johnson ("Experience with Cast Metal," *Review*, Dec., 1910) that contour inlays should be platinum, 1 part; pure gold, 24 parts.

The following prominent operators who believe in the restoration of perfect occlusion, reproducing planes, facets, and culci, are also in favor of a lighter platinum alloy to maintain those lines: "J. Lowe Young, R. Ottolengui, Henry Gillette, W. D. Tracy, F. T. Van Woert and T. P. Hinman (*see reports*).

We append the valuable report of Mr. Weinstein, whose laboratory so far as the reporter can discover, has done many successful large castings. He remarks on casting large pieces in gold:

**Weinstein.**

"Comparatively little of this work has been done generally for lack of not only apparatus, but proper gold alloys. The ordinary golds obtainable, such as 18- or 20-carat or coin gold, are all too soft when cast into large thin sections. Clasp metal, which may be anything from 14-carat gold very high in copper to 16-carat gold high in platinum, has proven unreliable on account of brittleness, etc. For the last four years I have used for this purpose the two following alloys (*see B. and C. alloys*). These two alloys are identical in tenacity and hardness and other general properties, as will be shown later. Their contraction in the cast form is lower than pure gold or platinized gold, and they make castings of satisfactory density and rigidity without brittleness.



"The tables given below were worked out and will explain the procedure in developing the formulæ:

### Casting Gold.

A.

*Soft for Inlays, etc.*

*(Nitrous Oxide or ordinary Blow-Pipe)*

Pure Gold, 60 to 90 parts; Plate No. 2, 10 to 40 parts, according to hardness desired.

Color and fusing point approximately same as pure gold when low percentage of No. 2 is used.

B.

*For Nitrous Oxide Blow-Pipe*

*Maximum Hardness for Casting Sections of Bridge-work, Partial Dentures, etc.*

Pure gold .....	80.0 parts
" Plat. Rhod. ....	8.5 "
" Palladium .....	3.5 "
" Silver .....	2.0 "
" Copper .....	6.0 "

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100.0

Fusing point about 50° F. higher than pure gold.

C.

*For Gas and Air Blow-Pipe*

*Maximum Hardness for Casting Sections of Bridge-work, Partial Dentures, etc.*

Pure gold .....	80.5 parts.
" Plat. Rhod. ....	.65 "
" Palladium .....	2.5 "
" Silver .....	2.5 "
" Copper .....	8.0 "

---

100.0

Fusing point approximately same as 22-carat gold Cu.Ag Alloy.

"These alloys may be re-melted and re-cast without perceptible deterioration. No flux is required when making the actual cast, but a flux of a reducing nature should be used when melting up residue buttons for future casting. Potassium nitrate or similar strong oxidizing agents should never be used in connection with alloyed golds, for the simple reason that they oxidize just the elements it is desired to retain in a reduced metallic state and not in an oxidized state.

"As a general proposition, large pieces should be cast in sections and united with solders of corresponding fusing point and color. A long, narrow saddle or section or a plate can be cast better vertically than horizontally. One sprue, 14-13 gauge B. and S., is ample as the shape of the pattern becomes a continuance of the sprue and the molten metal drops directly into the cavity (mold) and therefore in the line of least resistance. This applies particularly to casting long thin sections, and this method is more certain than where the sprue or sprues are placed at right angles or nearly so to the pattern.

"It is essential to have a perforation in flask base of casting apparatus so that the air cannot be compressed in the mold. This is a very frequent cause of failures in casting, particularly with pure gold."

He says of *sprues* and *pressures*: "Sprues 14 gauge to 13 gauge B. and S. are generally advisable. Seven to nine pounds air pressure is sufficient for inlays, sections of bridgework, saddles, etc. When very small inlays are to be cast, the pressure must be increased to 12 or 13 pounds, especially if the size of the sprue is decreased to 17 or 18 gauge B. and S. Multiple sprues are hardly necessary except in some rather rare instances, and it is not advisable to attempt to cast several inlays in one flask.

"In casting pure gold it is essential to use a small sprue and not too large an excess of gold, for the reason that pure gold retains heat much longer than alloyed gold, has a very strong tendency to globulate in a spheroidal form, and, if the excess is large and superheated and the sprue large the tendency is for the uncongealed residue button to draw the casting toward it and consequently either a separation of the sprue occurs or rounding of the margins of the inlay, or both.

Weinstein makes the following notes on the properties of alloying elements, which are appended because they are at variance with the accepted usages.

Au and Ag. Contraction approximately same as pure gold (not more).

Au and Cu. Contraction less than pure gold.

Au and Pt. Contraction more than pure gold.

Au and Pd. Contractions approximately same as pure gold (not more).

*Silver* does not increase hardness of gold (distinctly contrary to all works on dental metallurgy).

*Copper* increases hardness of gold approximately two and half times as much as equal per cent. by weight of platinum.

*Platinum* does not alloy uniformly with gold if over 10 per cent. is used.



## Items of Interest

*Rhodium*, 10 per cent. Rh, 90 per cent. Pt, is used instead of pure platinum. Makes better alloys.

*Iridium*. Not used. Absolutely detrimental. Segregates and makes uneven alloy.

*Palladium*. Alloys perfectly, increases fusing point more than Pt, and is used to partly replace Pt and make more uniform alloy. More than 5 per cent. has strong decolorizing action, and therefore not advisable.

In discussing the advisability of a hot or cold mold, he says: "At the present time, owing to improvements that have been made along the line of wax, investment compounds, etc., the cold flask is unquestionably indicated, except possibly in the case of 'pick-up' (contoured pieces as a post of wire, etc.).

"It must be understood, of course, that the terms hot and cold flask are only relative, because with the usual casting methods in vogue when the operator starts out to melt his gold a very hot flask will cool down considerably and a very cold flask will heat up considerably. Consequently, the difference in temperature between the so-called initially hot or cold flask is not nearly so great as may appear at first sight."

Investment materials and wax patterns he reports as follows:

"The refractory compounds for casting process available now are superior to those obtainable at the time Price's artificial stone was introduced, and while the Price's method may have some advantages over the amalgam die method for inlays, I cannot find any other particular application for it. The investment compounds that contain graphite leave a good deal to be desired, on account of the difficulty of making a *dormant aqueous mixture* of graphite, silica, plaster, etc.

"The investment compound should not contract at all under any conditions, but should expand slightly so that it is absolutely tight in a slightly expanded casting ring. It is essential that it have this property, because we have not only the uncontrollable contraction of gold to contend with, but also the contraction of the wax from the time any pattern is formed until the investment is set around it. Consequently, any shrinkage of investment should be avoided.

An *expanding* soldering investment is essential. This matter *has been completely neglected*, as though there was no such thing as contraction in bridgework."

"It is unnecessary to repeat the investigations of Van Horn on this subject, as he has covered this fully. He is essentially correct on all points and it is absolutely impossible to cast an inlay with any satisfactory degree of accuracy *unless the principles laid down by him are followed*."

Weinstein admits that it is possible to cast direct to porcelain, but believes it is not practical, and that the majority of operators are opposed to it because the contraction of the metal is ten times that of porcelain.

## Sixth International Dental Congress.

### Brief Summaries of a Number of the Essays and Reports Prepared for the Various Sections of the Congress.

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#### Section I. Dental Anatomy, Histology, and Physiology.

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##### **The Soft Fibre of Tomes a Tubular Structure.**

**By Dr. E. F. Bodecker, Berlin.**

1. The contents of the dentinal canaliculi, according to the views generally accepted, consist of a solid fibre as described by Charles Tomes, surrounded by a sheath (of Neumann).

2. Author, however, claims the fibre in the living dentin is not solid, but is tubular in form. Neumann's sheath is co-existent with the tubes.

3. This tube, being a prolongation of the odontoblast, should be named "odontoblastic tube" or "tubular process of the odontoblast." The name thus describes its form and origin.

4. The odontoblastic tube contains the nutritive fluid for the dentin and the enamel.

5. The contents of the odontoblastic tube, which in life are fluid, coagulate upon the death of the pulp. This explains why many microscopic slides of dentin show the odontoblastic tubes as fibres.

6. If the fluid contents of the odontoblastic tube (coagulated by most fixing agents) are identical with the "soft fibre of Tomes" we are forced to conclude that a sheath inclosing the soft fibre is present inside of Neumann's sheath.

7. The walls of the cell (odontoblast) and those of the tube, as well as the contents of the cell and tube, are continuous.

8. The tubular processes of the odontoblasts will be shown in micro-photographs.

9. The tubular process of the odontoblast carries the circulatory fluid to the dentin and enamel (afferent), whereas the space formed between Neumann's sheath and the walls of the tube transport the fluid back to the pulp (efferent). By this theory Neumann's sheath for the first time receives a physiological importance.

##### **The Amylolytic Activity of Saliva.**

**By. E. Lovatt Evans, D.Sc., Institute of Physiology, University College, London.**

The amylolytic activity of the mixed saliva has been studied by the author (*Journ. of Physiol.*, xlv. 191, 1912) by a method which gives accurate comparative results, and it has been shown that the action very closely resembles that of malt amylase, both as regards the products formed (maltose and stable dextrin, and afterwards traces of glucose) and as regards the dynamics of the reaction. The method used has been shown to give better results than two of the commonly used methods do (*Ib.* xlv. 220, 1912). The influence of food on the amylase content has



also been studied (*Biochem. Zeitschrift. Bd. xlviii. 432, 1913*); an increase in amylase has been observed after carbohydrate food, but not after protein and fat meals. The increase lasts for some hours, and the influence of psychic factors was excluded by sham meals of carbohydrate, which were without effect. The cause of the increase was shown to be an increased activity of the parotid secretion. Parotid saliva is about four times as active as the other mixed secretions of the mouth taken together. The importance of these facts in the physiology of digestion is discussed in the original paper. The author cannot agree with Pickerill that the only use of the saliva is to remove traces of starch from the mouth and thus prevent caries ("The Prevention of Dental Caries and Oral Sepsis," 1912, p. 160). Unpublished experiments made in conjunction with Mr. A. W. Wellings failed to show any relation between amylase content and dental caries. Moreover, the saliva of many animals not liable to dental caries is free from amylase.

**The Staining of the Dental and Adjacent Tissues of Some Rodents by Means of Trypan Blue Introduced into the Animals During Life.**

**By H. W. Wellings, L.D.S. Edin., M.D.S. B'ham.**

The recent developments of intra-vitam staining methods are largely due to the work of Ehrlich and others in chromotherapy.

Trypan blue is one of the benzidine series of aniline dyes. Its exact constitution is doubtful, hence it is impossible to represent it graphically.

It is, however, a derivative of the condensation product of tolidine with amino-naphtholdisulphonic acid.

Bouffard, of the Pasteur Institute, first described the appearances macroscopical and microscopical of the normal tissues of an animal under the influence of trypan blue.

Goldman described and worked out the histogenesis of stained cells found everywhere in the connective tissue throughout the body. He called them pyrrol cells and identified them with Maximov's "Resting Wandering Cell," the rhagiocrine cell of Renaut, Metschnikoff's macrophage, and the adventitia cell of Marchand.

Up to the present time the effect of this dye upon the dental tissues has not been investigated, and it is with this object in view that the work here described is undertaken.

The developmental and mature tissues have been examined in rats, mice and guinea-pigs, the dye being introduced into the animal subcutaneously, or intraperitoneally (.01 grm. of color per 20 grm. body-weight of animal). The dose is repeated about the eighth day until the creature is in a high state of coloration. The animal is then killed, the tissues fixed in 10 per cent. formalin and sections prepared as may be desired.

Examination of innumerable sections prepared in a great variety of ways disclosed appearances from which the following conclusions were drawn.

**Conclusions.**

- (1) It is possible to stain certain cells of the mature dental pulp

and peridental membrane in the rodents mentioned by means of the intravital application of trypan blue.

(2) Similar cells can be shown to exist in great numbers in the developing dentine papilla after calcification has commenced; all about growing bone, and in the connective tissue around the developing enamel, many of which lie closely to the cells of the stratum intermedium.

(3) The pulps of the teeth of persistent growth contain an exceptional number of stained cells.

The matrix of dentine and bone is stained very lightly, the colour disappearing quite soon. The walls of the dentinal tubules and the Haversian canals do not stain, neither do the dentinal fibrils, but the perosteum stains deeply.

(4) The secondary dentine formed in the center of the pulp cavity of persistently growing teeth stains deeply.

(5) Enamel developing at the time of the introduction of the stain and that formed while the stain is in the body takes on a very brilliant color, which subsequently fades as calcification progresses.

(6) It is not possible to stain already calcified enamel by means of trypan blue.

(7) The dye is distributed more or less through all the tissues of the mouth, the color being—

(1) In the plasma in which the tissues are bathed.

(2) In certain specific cells of the connective tissue.

(8) These cells are identical with Goldmann's pyrrohol cells, and are distributed throughout the body except the nervous system.

(9) They have pronounced phagocytic powers, and possess the property of wandering about the body in an exceptional degree.

(10) They are concerned in inflammatory and other pathological conditions, and in reparatory processes.

(11) They may also be chemical and nutritional factors in body metabolism.

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## Section II. Dental Pathology and Bacteriology.

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### Calcium Metabolism and Dental Caries.

By F. W. Broderick, M.R.C.S., L.R.C.P., L.D.S. Eng. Bournemouth.

Dental caries is due to the solution of enamel by organic acids, produced by fermentation of carbohydrate food-substances around the teeth.

If the saliva be sufficiently alkaline and in sufficient quantity, this acid will be neutralized at moment of formation and no caries can occur.


Alkalinity of saliva is due to inorganic alkaline salts, of which the most important is calcium carbonate in solution as a bicarbonate.

Utilization of calcium in the body is regulated by the ductless glands working one with another, some being absorbers of calcium, others eliminators.

Calcium in the body is found in two forms:

(a) Fixed in the tissues.

(b) Floating, *i. e.*, waiting to be utilized as required either as (a) or for repair purposes.



## Items of Interest

If calcium elimination is increased or absorption is diminished, the floating calcium will first be affected and a low calcium be the result.

Later the fixed may become broken down and eliminated (osteomalacia).

The suprarenal, pituitary, and thymus glands are calcium consumers.

The reproductive glands are calcium excretors (Bell).

The thyroid is difficult to place: possibly it has several secretions acting in different ways (Biedl).

The ductless glands act as eliminators of toxins and any acute illness will throw a strain upon them. For a time they become hyperplastic and over secrete, and then follows a period of reaction and lessened activity with insufficiency of secretion, the result being, especially in childhood when reproductive glands are inactive, great increased excretion of calcium, and consequently lessened floating calcium in the body. The saliva will suffer together with other tissues, and becomes less alkaline. The parotid saliva, always the least alkaline in health (Schafer) may even become acid, therefore less able to neutralize acids formed by fermentation in the mouth and consequently caries results.

There is an intimate relation between the suprarenal medulla (which produces the adrenin) and the sympathetic nervous system, by way of the chromatin tissue which is peculiar to both. The injection of adrenin acts on the saliva glands in the same way as stimulation of the sympathetic, *i. e.*, it produces a saliva rich in salts. Consequently suprarenal inactivity would give a saliva poor in lime salts.

Utilization of lime salts:

(a) *Childhood.* For growth, the thymus holding the reproductive organs at bay until growth is complete.

(b) *Pregnancy and Lactation.* For growth of coitus and formation of milk. The ovaries here are also inactive and calcium utilizers have it all their own way.

In both these cases the calcium equilibrium may be very easily upset, and a certain amount of starvation result. N. B. Both periods of excessive caries.

(c) *Middle Life.* Calcium equilibrium most stable.

(d) *Old Age.* Excess of calcium stored in tissues, *e. g.*, blood vessels, joints, etc. The reproductive glands are not so efficient and normal calcium elimination is deficient.

N. B. practically no caries. Hard sclerotic teeth of gout.

I have found that the saliva of patients suffering from acute infectious disease is deficient in alkalinity (most markedly so in measles), that the calcium content was considerably less, and that both the alkalinity and the calcium content could be considerably raised by giving a polygland substance of suprarenal, pituitary and thyroid.

The action of the thyroid is somewhat difficult to understand as clinically, thyroid feeding increases the calcium excreted in the urine, and also patients with arterio-sclerosis do very well on thyroid. On the other hand in certain cases it would seem to act as a utilizer of calcium, *e. g.*, ununited fractures heal with great rapidity under thyroid medica-



tion. Chilblains disappear rapidly when treated with calcium and thyroid, the action probably being that it enables the body to utilize fixed calcium temporarily for repair purposes. It also helps to regulate the action of the sympathetic nervous system (note its action on nocturnal incontinence in children). For this reason I added it to my polygland.

My conclusions are that the predisposing cause of dental caries is a diminution of the calcium utilizing power of the body, due to a want of balance in the secretions of all the ductless glands, brought about by any pathological condition causing an extra strain to be thrown upon them. Acute infectious fevers in childhood will be the most important, but pregnancy in women, with an unstable calcium equilibrium and any illness or run-down condition, may be responsible.

If this is so dental caries is a preventable disease, and the treatment (to bring the calcium index back to the normal) is in the hands of the medical profession, either by a polygland substance similar to the one I used, or possibly by calcium salts alone if the patient can utilize them. The results should be beneficial not to the teeth alone, but should shorten convalescence considerably by reason of the help and stimulation of the defective toxin eliminators.

#### **The Aetiology of the Dental Caries.**

**Dr. Leo Fleischmann, Private Docent of the Ulenia University.**

The author's standpoint is contrary to the opinion of Miller, that caries constitute a mere parasitic disease, the caries of the enamel and of the dentine being in their pathogeny and their progress a thoroughly identical process. The author bases this his opinion on histological demonstrations as proved by sections across carious enamel (method Bödecker). He could state above all, as before him already Baumgärtner had done, that micro-organisms enter between the enamel rods, thus first reducing the interprismatic substance, rich in inorganic matter, while the prisms still remain preserved.

By further investigations it was proved that the prisms themselves get permeated by micro-organisms, and that they at last decay to a shapeless mass.

One sees, therefore, exactly the same phases as in the caries of the dentine, whereby the interprismatic substance plays the part of the dentinal fibrils and the prisms that of the dentine matrix.

The obsolete opinion that micro-organisms could only enter into some previously decalcified enamel is denied by the author as an *a priori* accepted and never proved supposition. Theoretically it may, of course, be possible that micro-organisms enter open-lying organic substances. That organic substance, in defectively calcinated or non-calcinated condition, partly can lie openly in the enamel on the surface—has been proved from different sides. That they occur at places of predilection (fissures, interproximal faces, and at the bottom of a tooth) has only been recently shown by Gottlid. The fact of the interprismatic substance decaying first cannot be explained by the action of acid, for we know that by the action of the acid the decay begins with the prisms and is followed by that of the substance. This fact can therefore only be considered as caused by bacteria.

This is the reason why the author pictures to himself the proceedings of progressing caries in the following manner: that the micro-organisms enter on the face of the enamel the organic constituents, destroying the organic substance, and on this spot generating an acid, which again in its turn dissolves the calcium salts in the surroundings. The micro-organisms enter thereupon the decalcified prisms, destroying these as well.

The question whether the carbohydrates of the food likewise have any influence in this matter, the author prefers to leave open.

Considering all these theories, the principal difference lies in the supposition that, according to the parasitic theory the acid generates on the very spot—that is, in the tooth itself—and not outside of the tooth.

This parasitic theory of caries enables us to explain all the different phases of caries-immunity by far better than all other theories which allow the acid to generate outside the tooth, thus substituting a biological possibility for a chemical reaction.

A chemical reaction *must* take place.

A biological possibility *may* take place.

**The Report of a Case of Extra-Capsular Odontocoele.  
By H. Alan Forty, Leeds and H. Hopewell-Smith, London.**

The case which we are presenting under the title of an Extra-Capsular Odontocoele is of peculiar interest—since I had the somewhat rare opportunities of observing it over a period of years—1906-12, six years in all.

During these six years I was enabled to study from a clinical point of view the slow but steady development of the tumor in the right maxillary incisor region, which forms the basis of this report.

The patient, a boy, G. W., æt. 8-9, was brought to me in August, 1906, on account of the unerupted incisor teeth in the right maxillary region.

The condition—as the plaster models show—was as follows:

Maxilla—First molars, right and left, had erupted, also the left first and second incisors, together with the deciduous canines and molars all in place. The condition of the mandible was normal in regard to development of teeth, but showed some contraction and crowding.

The right maxillary condition exhibited a fullness as if the succedaneous teeth were about to erupt.

Owing to the unilateral absence of the incisors at about nine years of age I had a skiagram taken, and the interpretation I put on it was that the teeth present in the alveolus were the canine and incisors, but abnormally placed, therefore retarded in erupting, and I decided upon a waiting policy.

The earlier history of the patient was that he was a first child and forceps were employed at birth—evidently considerably compressing the head and lacerating the scalp—for a scar longitudinal in direction exists in his occipital region, and the other blade will have probably compressed the facial and maxillary region. Whether this has had any effect in predisposing towards the present condition is difficult to say; at any rate it was antecedent, and I record it as part of the history.

The boy was backward in mental development—slow in speech and slow and deliberate in his movements, especially in putting on and off his clothes.

In January, 1907, as the swelling was increasing in size and no teeth appeared, I sought Mr. Lewin Payne's opinion in consultation.

Mr. Shenton skiagraphed the case for Mr. Payne, who was of the opinion that the three teeth were present, but possessing curved roots and abnormally placed. He inclined to the opinion that they would eventually erupt.

I suggested at this date a cystic cause of the retarded eruption—but the skiagrams rather negatived this, since no thickening of the overlying wall or capsule could be made out.

In 1908 I again had the case skiagraphed by Dr. Rowden. The result shows more clearly the three teeth, well developed but juxtaposed in abnormal relation—also the overlying wall of bone—but scarcely giving in clear definition the morphological peculiarities of the first incisor—to lead one to diagnose the condition exactly.

One can but assume that the special features of the first incisor and its capsule had not at this date developed to an extent to exhibit anything to lead one to suspect the developmental changes taking place.

In July, 1909—three years after first seeing the case—the second incisor pierced the gum—in rather a lingual position—about three or four years later than the average age for eruption.

At this date the deciduous molars had been replaced by premolars unusually well developed.

In April, 1910, the canine tip presented in a buccal position, *i. e.*, at about the normal time for eruption.

A skiagram the following year revealed the teeth clearly defined and an unusual shadow of the first incisor.

In May, 1912, the teeth in the maxilla were all erupted save the right first incisor, and the physical signs now were a rounded bony swelling painless to touch, at the most prominent part of which the hard wall was exposed owing to the mucous membrane thinning over it. This exposed portion was thought by the patient and friends to be the erupting tooth, but the examination with a probe proved its true nature to be bone.

I now diagnosed a dentigerous cystic condition, and another skiagram by Dr. Rowden shows beautifully the peculiar pathological excrescence on the unerupted incisor. A rounded mass of less dense texture attached to the lingual sulcus of the teeth—so I made out.

We then decided upon radical treatment, having waited six years; and the same month Mr. J. F. Dobson, Surgeon to the Leeds Infirmary, whom I called in consultation, undertook the operation.

A mucous flap was resected, exposing the bony enlarged rounded wall. This was chiselled away and the tooth was seen lying in a cavity rather deeply placed and rotated—making removal particularly difficult. On further bone removal, however, we rescued the tooth with its special features—more or less undamaged.

The cavity was scraped and packed, and healed most satisfactorily, with very little alveolar deformity—which was easily restored by artificial means.

I recognized the importance of the specimen we were able to preserve intact from the point of view of development, and, collecting the fragments of bone wall—follicle remains—and tooth—I at once sought the aid of Mr. Hopewell-Smith, whose research into the genesis of cystic conditions is of such far-reaching importance in the study of tooth embryology.

The accompanying pathological report is furnished by Mr. Hopewell-Smith.

(I regret our inability to present the pathological report.—Ed.)

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### Section III. Dental Surgery and Therapeutics.

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#### **Replantation of Teeth in Severe Cases of Pyorrhoea Alveolaris.**

**By Sten Hager, Stockholm.**

The method of the late Dr. Geo. Forssman.

The way in which a replanted tooth can be made to adhere to the jawbone is by resorption on the surface of the root and new growth of connective tissue and bone, but sometimes the entire root is destroyed, beginning at the apex. The root-apex of the extracted tooth is therefore replaced with lead after removing the pulp and filling the canal from this direction. All foreign substances on the root are removed, the periodontal membrane not being destroyed. Alveolus is made deep enough. Spraying with antiseptic. A retaining appliance made out of metal bands, fixed with cement, must remain for three months. My first replantation performed in 1909. Result excellent. Patients demonstrated before the Swedish Dental Society several times. Replanted teeth firmly fixed. This treatment is justified only in desperate cases. Most suitable for replantation are the six anterior teeth of the upper jaw.

#### **The Treatment of Sensitive Cavities.**

**By E. E. Brown, Dundee.**

The fear of dentistry and the need of more gentle and painless methods of treating sensitive cavities. New methods of doing so. Analyzed  $N_2O$  and  $O$ ; neither convenient nor necessary. Ethyl chloride spray very useful when immediate treatment is required.

Hypodermic injections also very useful in certain cases.

Use of formaldehyde gas given off by paraform has the useful properties of hardening gelatine, rendering it insoluble and inflammable; works very quickly in the teeth of young people and on carious dentine; very irritating if used near the pulp; good deal of judgment required in its use. The use of para-mono-chloro-phenol preparation of carbolic acid and chloride irritating and strongly antiseptic and anodyne, used in cases where the caries has penetrated near the pulp. If a tooth has given sufficient pain to keep the patient awake at night it should be devitalized. The para-mono-chloro-phenol has a modifying effect on the arsenic giving much less pain. The dentine of young people much more porous than that of old dental tubes obliterated in the old subjects.

**An Ideal Cement for Stopping Root-Canals.  
By Dr. Vincenzo Guerini, Naples.**

An ideal cement for stopping of the root-canals can only be obtained by a method which permits of hermetically sealing the apical foramen without leaving compressed air in the canal, and which is carried out with a substance not only antiseptic, but also free of irritating properties, so as to avoid the possibility of an apical periodontitis or even of an alveolar abscess.

My cement perfectly fulfils all these requirements. The paste made with it can be shaped in small conical pin-like sticks, by rolling it between the finger and a suitable plate. One takes these small sticks with converging-forceps or other suitable instrument and introduces them into the root-canal, reaching and stopping the apical foramen and then compressing the cement in the canal-cavity. In ten to twelve minutes the cement is hardened and one can proceed to the stopping of the carious cavity at the same sitting. By the proper use of this cement no failures occur, and even in the cases when an apical periodontitis pre-exists, this becomes cured.

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**Section IV. Dental Physics, Chemistry, Radiography, and Metallurgy.**

**X-Ray Observations on Abscesses, Cysts, and Root Resections.  
By Conrad H. Achner, Ph.D., L.D.S. Eng.**

The writer desires to emphasize the following points:

1. The great importance of X-Raying every month in order to ascertain the condition of alveolus and hidden abscesses.
2. The darkness of the shadow on the skiagram indicating an abscess cavity depends entirely on the depth of the bone lesion and the amount of bone still intervening between it and the film.
3. One can diagnose a cyst from a granuloma on a skiagram by the shadow being of greater density, more defined regular outline, and the tendency of sometimes displacing the neighboring teeth.
4. The great importance of removing the entire root in extractions, the scraping out of abscess cavities, or removal of granuloma in order to prevent suppuration, formation of sinuses or cysts.
5. The presence of a shadow around the root apex, and the history of a sinus, is sufficient to denote the presence of a granuloma.
6. The correct way of reading skiagrams enables one to determine the extent of the bone lesion, and thus prevent waste of time by treating with drugs where a radical treatment ought to be performed.
7. A tooth causing an abscess cavity or a dental cyst, if otherwise in good condition, can be saved by means of apical resection.

**The Hardening of Metals.  
By C. Martin Cowry, D.Sc., F.R.S.**

Metals may be hardened either by mechanical or by thermal treatment. The former process is the more general, since nearly all metals



are hardened by cold-working, *e. g.*, by rolling, hammering, or wire-drawing. Two effects are produced (i) internal strains are set up in the metal (Heyn); (ii) the crystals are broken down, a hard, glassy, amorphous form of the metal being produced wherever slipping takes place (Beilby). The effect of annealing is (i) to remove the internal strain; (ii) to cause the amorphous films to crystalize; (iii) to cause the crystals to grow at one another's expense, so that the coarsely crystalline structure of the original metal is finally restored.

Hardening by thermal treatment takes place when steels (of various compositions) are chilled, and also in the case of some other alloys such as the aluminium bronzes. The hardening may be attributed to the fixation of a hard form of a polymorphous metal, but this is now held to be an inadequate explanation, and the hardness of chilled steel is ascribed, at least in part to strains set up by the sudden chilling or by incipient recrystallization.

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## Section U. Dental Prostheses.

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### Porcelain Work.

By Douglas Gabbell, M.R.C.S., L.R.C.P., L.D.S. Eng.

Porcelain powder cannot be packed to more than two-thirds fill any space; less will appear full.

This is the only cause of shrinkage.

There are other causes for distortion and fracture during fusing.

Maximum consolidation takes place at a temperature far below the advertised fusing points, and before glazing of the surface.

Time is as important as temperature in fusing.

The amount of shrinkage cannot be reduced, but the effects can be controlled.

Porcelains vary very little in strength and shrinkage, but very much in fusing points, working qualities, appearance, weight and solubility.

Platinum gauze and wire, correctly placed, can greatly strengthen and assist in the manipulation of porcelain.

Price's Artificial Stone is of great value in manipulating porcelain.

Porcelain body should be fused enclosed in an investment and not openly exposed in the furnace.

Some practical applications of porcelain.

### Removable Bridgework and Saddle-Bridges.

By Dr. H. C. S. Angel, Copenhagen.

The root-canals must be easy of access, and the root as little weakened as possible. The bridges must be made so that they will fasten well and yet be easy to remove. When the bridge-pillars are molars and premolars they are cut down a little below half height, and the sides are made cylindrical (with a transverse section like that of the root). A

cylindrical ring of platinum-iridium or platinum-silver with a cover of the same material, is made for cover to these and soldered to it. Over this another cylindrical platinum-iridium or platinum-silver ring is adjusted. To the exterior of the latter, on the visible side, is soldered a thin gold plate twenty-four carats fine. On the exterior ring the crown cover is cast with a buttonlike stop down to the capsule directly placed over the root. If a greater contour of the exterior capsule is required mesially or distally, a little of the upper edge is removed at this place, and the contour is restored by casting in gold on the ring together with the crown cover. When the bridge-pillars are incisors and canines, a thinner platinum-iridium or platinum-silver cap with tube fastened to it (which must not be too substantial) is used. Outside this is adjusted a platinum-iridium or platinum-silver ring a little thicker than the former. On this is soldered a cover and a pin fitting into the tube. A Steele facing is now ground on in such a manner that the foremost part of the exterior cap is removed. The tooth is now standing upon the foremost edge of the interior cap. The tooth is soldered to the exterior cap. The remainder of the foremost half-part of the ring of the exterior cap is then removed. The foremost visible part of the ring of the interior cap is covered with gold twenty-four carats fine.

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## Section VII. Oral Surgery and Surgical Prosthesis.

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### **Dental Sepsis as a Predisposing Cause of Cancer.**

**By F. St. J. Steakman, D.P.H., M.R.C.S., L.R.C.P., L.D.S., Dental Surgeon to the West London Hospital; Dental Surgeon, Lecturer on Dental Histology, and Tutor to the National Dental Hospital and College.**

Analysis of the deaths from cancer in England and Wales during the four years 1901 to 1904, showing the parts of the body most frequently affected. This proves that in the male 85.1 per cent. and in the female 86.5 per cent. of all cancer, apart from that occurring in the sexual organs, occurs in the alimentary canal and its associated parts. That long-standing chronic inflammation in the sexual organs, and in other parts of the body, are known to pre-dispose to the development of malignant disease. That the great majority of persons suffering from cancer in the alimentary canal have advanced pyorrhœa alveolaris, which has been present very many years. That this advanced periodontal disease is not nearly so common in persons not suffering from cancer. That there is no doubt that the constant swallowing of infective material from the mouth can, and frequently does, produce a chronic gastritis. That the majority of patients suffering from cancer of the stomach have had chronic gastritis for many years prior to the development of the malignant disease.



**Some Clinical Observations of Regeneration of the Mandible After Caries and Necrosis.**  
**By M. H. Cryer, M.D., D.D.S., Professor of Oral Surgery, University of Pennsylvania, Phila.**

There is considerable difference of opinion as to the agencies responsible for regeneration of the bone. The writer inclines to agree with Macewen that the growth of bone does not depend upon the periosteum. The growth of the mandible depends on an interstitial process which varies in different portions of the bone at different periods of life. The regeneration of new bone is brought about through the working of the osteogenic system in the bone remaining.

*Causes of loss of mandibular bone by necrosis.*—Interesting cases are cited, the earliest found being those of Percy of Paris in 1791. General discussion of cases under the writer's observation. Periosteum is absent in many cases, having been lost by suppuration, but the great majority of them when properly treated recover without formation of sequestra. In severe cases sequestra are thrown off, but new bone is formed without loss of the contour of the face. Report of cases in which new bone has been regenerated to fill up gaps, or to reunite one segment of bone to another. Illustrations, X-ray and others, of cases of varying ætiology, such as tuberculosis, phosphorus poisoning, injections, use of hydrogen dioxide, and local septic conditions of the teeth.

**Case of Abscess in the Neck, of Dental Origin, Cured by the Anti-Staphylococcic Vaccine.**  
**By Dr. B. Landete.**

The patient was a man thirty years of age, of feeble constitution and presenting an abscess in the left side of the neck arising from periodontitis in connection with a molar tooth. After eight or ten days of fruitless treatment by warm antiseptic bath, extraction of the tooth, and disinfection of the wound and the mouth, treatment by vaccine was proposed to him and this gave very good results.

Four injections were applied with intervals of five days, the first injection being of half a cubic centimetre, and the last one of two cubic centimetres.

The patient felt after the first injection a great *local* and *general* reaction, as when twenty-four hours had elapsed he had an attack of fever. At the second injection he only suffered a very slight febrile attack, and this was six hours after application; during the following injections and notwithstanding the increased proportions, the patient was not in the least disturbed.

Improvement took place immediately after the second injection.

I am convinced that vaccines will afford excellent results in this affection.

**Surgery of the Maxilla-Post Operative Treatment by Iodic Fillings.**  
**By Dr. B. Landete, Madrid.**

After operation upon the maxillæ, there remain bony cavities which we commonly fill with medicated gauzes, and which take long to become definitely cured, and in the meanwhile require constant care.



To avoid this inconvenience we have tried the filling of the post-operation bony cavities with different iodic pastes, the results being exceedingly satisfactory.

We used for the purpose Mosetig's iodoform mixtures, but objections on account of the smell has decided us to change the formula. The pastes consist of iodol-iodocresol-azodolene-nosophene, etc.—10 per cent. of these products to be mixed with 50 parts of spermaceti and 50 parts of cinnamon and lemon essences, etc. We still use local anæsthetics so as to avoid pain when filling the alveolus of the teeth extracted on account of periodontitis.

We use a glass syringe previously warmed, in order to make the paste fluid, as it becomes hard when cooling.

#### **A New Treatment of the Maxillary Sinusitis.** **By Dr. B. Landete, Madrid.**

The well-known inflammation of the maxillary sinus has been treated by several processes, according to its character: empyema, pyosinus, simple sinusitis (pyosinusitis), or fungous sinusitis, caused by hypertrophy of the mucous membrane which covers the sinus.

More than a year ago (May, 1913) we first operated on a patient by our new extra-simplified proceeding. The case was a physician, suffering for fourteen months from nasal suppuration consequent on periodontitis of the first right upper molar, whose alveolus exhibited a fistula. We employed the first time the Caldwell-Luc radical operation, through the canine fossa, after local anæsthesia; careful scraping of the sinus was performed; we then proceeded to fill it with iodoform paste and immediately suture the mucous membrane.

The patient became completely cured, so that it was not necessary to operate further; the cure was therefore by first intention. We, so far, have treated about one dozen cases and employed different iodic mixtures or pastes—iodol, iodoanisol, iodocresol, azodolene, pellidol, etc., etc., all of them having been followed by marked success.

In presence of such results, we venture to propose this proceeding to our colleagues.

#### **Toothache in the Toothless.** **By. Dr. Med. Max Melchior, Chief Physician, Docent of Surgery at the School of Dentistry, Copenhagen.**

It is well known that a patient may feel pain in an amputated limb, and that pain caused by a blow on the ulnar nerve is felt at the fingertips; but less is known of the toothache, which is felt by the toothless, although its occurrence is not rare, and the pain is severe. The causes of trigeminal neuralgias are numerous; they may be central or peripheral, and the familiar causes of neuritis, such as alcohol and syphilis, may be responsible, or the condition may be due to constipation alone, as pointed out already by Charles Bell. The condition to which the writer draws attention was described by Gross (Philadelphia) in 1870, and has since been scarcely noticed. The pain is severe and obstinate, being neuralgic in character, and occurring in elderly, toothless subjects. It is situated



in the remainder of the alveolar margin, or in the overlying gum, whence it radiates to the face and neck. The upper jaw is most often affected, and the area involved is usually very small. The soft tissues are less affected than in most forms of neuralgia of the jaws and face, and they may even escape entirely. When affected they are firm and adherent to the underlying bone and are cut with difficulty. The bone at this point is abnormally hard and ivory-like, and its inclusion of nerve-endings is the cause of the pain. Excision of this bone is therefore necessary for recovery.

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### **Section VIII. Anesthesia. General and Local.**

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#### **Improvements in Local Anaesthesia by Novocain-Suprarenin.**

**By Richard H. Riethmuller, Ph.D. Univ. of Pennsylvania, D.D.S., Philadelphia, Pa.**

The modified instrumentarium consists of an automatic specimen jar with tightly clamped lid, and porcelain stand (to avoid oxidation) which allows for suspension of two syringes and one pair of aluminium tweezers (to avoid disintegration by iodine) in a modified alcohol glycerin solution; a glass tray with metal inset for resting sterile syringes and preventing accidental dulling and contamination of needles, with small covered tray for keeping needles, hubs, wrench and broaches in antiseptic solution; a bacteria-proof stock flask for Ringer solution. A new iridioplatinum needle constructed on the principle of the Gates-Glidden drill with weakest part near the hub to facilitate withdrawal of accidentally broken needle. Metal parts of syringe in contact with solution should be enamelled to avoid decomposition of solution. Statement of date of manufacture of tablets and tightness of rubber stoppers in tubes should be insisted upon. Ampoules should be tested in vacuum. Technique of injection to be practiced in green skulls and dry skull in which mucous membranes have been reproduced in wax up to the reflection. Colorless iodine solution (iothion) advocated for sterilizing field of injection and operator's palpating finger. Location of mandibular foramen in mixed races, such as American, requires further anatomical study. Lancing of gums before extractions, blood-pressure studies, use of thumb in left mandibular injection, external mandibular injection in ankylosis and infection, draining of wound after apical root resection advocated.

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### **Section IX. Oral Hygiene, Public Instruction, and Public Dental Service.**

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#### **Dental Inspection and Treatment in London County Council School.**

**By E. Edward Wallis, M.R.C.S., L.R.C.P., L.D.S., Dental Surgeon and Lecturer to King's College Hospital, Formerly Dental Surgeon to the Victoria Hospital for Children, Chelsea.**

Dental treatment for elementary school children in London is provided for by means of some twenty suitably located "Dental Treatment

Centres"; several of these "dental centres" form part of general "School Treatment Centres," in which eyes, ears, throat, and minor ailments are dealt with as required.

The centres, though subsidized by the L. C. C., are actually provided and managed by local Committees of hospitals, dispensaries, medical men, etc.

The premises have to be approved by the L. C. C. and the Board of Education, and the dental treatment is under the supervision of the Public Health Department of the L. C. C.

Dental inspection is carried out in the schools by specially appointed dental inspectors, "in order to provide a sufficient number of children for the work of the centres"; these inspections are held weekly or fortnightly, as required, and each inspection session is followed by an "address" to the assembled parents on the care of their children's teeth.

The Dental Treatment Centres are worked as part of an organized scheme for the dental treatment of the school children of London, in which preventive and curative treatment go *pari-passu*.

The dentists engaged in inspection and treatment are part-time officers, as also are the anæsthetists, who attend at regular intervals; trained nurses are also provided by the L. C. C.

The general principle of treatment involved is the greatest good of the greatest number, and consists in rendering each child's mouth functional and free for each session.

Ten more "Dental Centres" are to be provided this year, which will make a total of thirty located as found necessary.

### **The Liverpool Day Industrial School Clinic.**

**By R. J. Erskine Young, M.D. Edin.**

This clinic was started seven years ago, by the Liverpool Education Committee (in July, 1907), and therefore is almost synchronous with Cambridge—my appointment as Dental Officer dating from then. A serviceable equipment was provided, and I began work forthwith.

The first thing we did was to examine the teeth of all the Day Industrial School children, and this survey has been repeated regularly since that time for the benefit of new children.

- (1) *They are thus examined quarterly:*
- (2) *Their dental requirements are entered in a register carefully.*
- (3) *All children from five years old are sent to me alphabetically.*
- (4) *And receive treatment beneficially.*

"Save the first molars" is my motto, and then I do as much more as I have time for. The good results show in the physical, mental, and, I may add, moral welfare of the child.

I have to work for three hours on end. Shall I tell you the thought that helps and comforts me at times? It is this: "I am perhaps helping to save this child from consumption."

"Dental Disease and Tuberculosis" is the text of a sermon I should like to preach in season and out of season; of the connection between the two there is not a doubt. For every cavity filled, for every diseased tooth extracted, we aim and strike a deadly blow at possible tuberculosis. I wonder if this fact is known to 1 per cent. of our private patients?



One sometimes imagines oneself conducting an educational tour all over the country, telling people that if they will have their "teeth put right," they will help to diminish the death-rate, not only from tuberculosis, but other dread diseases as well. I would further emphasize the fact that dental treatment covers a multitude of sins. And this is what we are trying to do at the Liverpool Day Industrial School Dental Clinic.

**Public Dental Hygiene in Norway.  
By Dr. O. Smith Housken, Christiania.**

After the Berlin Congress of 1910, the work for the treatment of the teeth of the children in the Public (Common) Schools received a fresh impetus. On November 1, 1910, the first dental clinic of Norway was opened in *Krishaania*; shortly afterwards at Drontheim, subsequently at Bergen, several other towns, and in one country municipality, namely Aker.

All the clinics are municipal and subjected to the School Boards. The working expenses everywhere are paid by the municipal authorities, so that the treatment is free to all children. At all the clinics the beginning is made with the lower forms, going upwards in the school, and advancing annually by forms. On June 1, 1911, was founded the Norwegian Association for the Prevention of "Dental Diseases." A number of town and country municipal boards are entered as members, also official Sick Clubs, School Boards, etc. The Association receives an annual grant from the Government. By the aid of the Association has been published in print, "Dental Caries at the Age of Conscription," by Mr. Arentz, a captain in the sanitary service, in competition for a prize offered by the "Military Medical Society"; 8512 recruits from different parts of the country were examined by the military doctors. Only 5 per cent. had perfect teeth. On an average 11.4 teeth per individual were found to be damaged at the age of twenty-one. The public Sick Assurance (a Government and municipal institution) since its establishment is rendering free extraction of teeth to its members. In accordance with the resolution of the Storting (Parliament) of the present year, an aid may also, on certain conditions, be granted by the filling of teeth. The Government has commenced to appoint dentists at the Schools for the Abnormal, and at the Lunatic Asylums.

**Practical Results of School Dental Treatment in the Promotion of National Health.  
By Professor D. E. Jessen, Strassburg.**

Public mouth-hygiene is of international concern. Nevertheless its importance has only been recognized within recent decades, but it has now been introduced into all civilized countries. The basis upon which mouth-hygiene must be built is School Dental Treatment, and consequently this is the object in view at present in all countries.

From 1892 the town of Strassburg contributed an annual grant of about 1,200 marks for the dental inspection of school children, and thus recognized the necessity of their dental treatment, and thereupon opened the first municipal school dental clinic on October 15, 1902. The work was begun with limited accommodation, a modest equipment, and only



one assistant. Their yearly accounts amounted to 2,400 marks, and increased steadily to 11,400 marks in 1910. In the year 1911, when established in the splendid hygienic institution fitted out with model equipments, and specially built for the School Dental Clinic, the staff consisted of nine persons, and the annual cost amounted to 26,500 marks.

From the time of the opening of the School Dental Clinic 30,000 children were inspected, 70,000 treated, and in round numbers there were 75,000 fillings and 75,000 extractions in eleven years. Altogether the town of Strassburg had spent 152,000 marks on School Dental Treatment since 1892.

Soon other towns followed the example set by Strassburg. In less than ten years 213 School Dental Clinics had been established, having an aggregate yearly expenditure of 560,000 marks. Nearly two million national school children were entitled to be treated in the clinics, and altogether about 227,000 children received treatment in 1913.

It must be the task of School Dental Treatment to reduce the percentage of decayed teeth in the shortest possible time, and to increase that of the sound teeth in order to bring nearer the realization of our ideal of a completely healthy mouth of every child attending school.





### **The European Meetings.**

Never have dental meetings been held in such environment and amidst such stirring scenes as surrounded the Paris and London conventions. During the period selected by these associations events occurred which will make numerous dates live in history forever. The declaration of war by Austria; the mobilization of the Russian, French and German armies; the declaration of war by Germany; the invasion of Belgium by Germany and the declaration of war by England, were tremendous occurrences all crowded into a brief two weeks. In such times and under such mental stress unstinted praise should be given to all the men in executive charge of these meetings for what was accomplished, and especially for the hospitalities and courtesies extended at great personal sacrifice.

#### **The Paris Meetings.**

Of the Paris meetings it may be said, in spite of the fact that every day, every hour, brought the dread spectre of a World's war nearer, the committees and officers proceeded with the conduct of their prearranged programs with the same energy that would have marked their endeavors in times of greatest serenity, with the result that a real triumphal success was achieved.



## Editorial

The European Orthodontia Society and The American Dental Society of Europe, taking advantage of the fact that the London Congress would attract many Americans to Europe, invited many of their American confrères to accept places on their programs, thus making their meetings truly international in character. To further advance their purpose the two associations joined their dates. The Orthodontia Society met on Tuesday and Wednesday, July 28th and 29th; the American Dental Society of Europe on Thursday and Friday of the same week; and at the same place, the Hotel Continental, both societies uniting to present clinics on Saturday at l'Ecole Dentaire.

The Orthodontia Society's program included the following names: Dr. Chiavaro, of Rome; Dr. Calvin Case, of Chicago; Dr. Zielinsky, of Berlin; Dr. Ketcham, of Denver; Dr. Choquet, of Paris; Dr. Pullen, of Buffalo; Dr. Hecht, of Berlin, and Drs. Ferris, Butler, and Ottolengui, of New York. In addition, the list of clinicians included Dr. Jackson, of New York; Dr. Subirana, of Madrid; Dr. Lind, of Amsterdam; Dr. Korbitz, of Berlin; Dr. Lockett, of London; Dr. Law, of Berlin, and Drs. Anema, W. S. Davenport, Solbrig, and Villain, of Paris. This is certainly an international aggregation of names, upon which the committee deserves to be complimented. Besides these, such prominent visitors as Aguilar, of Madrid, Cryer and Guilford, of Philadelphia, and many others, were present and took part in the discussions. All the papers scheduled were read, and many most enjoyable visits to private offices were indulged in, so that the visitors and guests of the Orthodontia Society have the most pleasurable recollection of the earlier days of that memorable week.

### **The American Dental Society of Europe.**

By Wednesday morning, the day set for the first meeting of the American Dental Society of Europe, there must have been great mental tension, which was most wonderfully restrained by the men in Paris who were managing the meetings and the social events. It should be recalled that many of these men had relatives, young men in the prime of life, who must answer to the trumpet call in case mobilization was ordered, and that every practitioner must expect to see his practice completely killed in case of war. Yet the writer is certain that not one effort was relaxed in the pursuance of the prearranged plans.



## Items of Interest

No meeting was curtailed, no social function abandoned, and nothing was left undone which might contribute to the success of the meeting or to the comfort and entertainment of guests. And not one man uttered a word that disclosed his own anxieties until the last moment, at the complete conclusion of the men's banquet, which occurred on Friday night, when the great gathering of about two hundred of the most celebrated men in dentistry from all parts of the world suddenly discovered that mobilization of the French Army had been determined, and that the President of the Society, Dr. W. S. Davenport, had known this during the entire evening; had known, too, that his nephew must leave at midnight to join his command, and yet with supreme self-control and in most perfect manner he had acted as toastmaster in these unheard-of circumstances.

Since the writer's return to America he has learned that there is a possibility that Dr. Davenport may visit this country during the coming winter. If so, it is to be hoped that some entertainment may be arranged at which all those who were present in Paris may be in attendance to express their esteem and appreciation of his conduct at that never-to-be-forgotten banquet.

Like the program of the Orthodontia Society, that of the American Dental Society was international in character. Dr. Chiavaro, of Rome; Dr. Bryan, of Leysin; Dr. W. Capon, of Philadelphia; Dr. Eppright, of Cologne; Dr. McNeill, of Vienna; Dr. Boedecker, of Berlin; Dr. Ottolengui, of New York; Dr. Sturridge, of London; Dr. Gordon White, of Nashville; Dr. Francis Brook, of London; Dr. Wm. Dunn, of Florence; Dr. Chayes, of New York; Dr. Spring, of Dresden; Dr. C. N. Johnson, of Chicago; Dr. Carmichael, of Milwaukee, and Dr. Rhein, of New York, all read papers, and the essays presented were fully up to the reputations of these men and the transactions will form one of the most valuable volumes ever issued by the Society.

### **Social Functions.**

A few words must be said of the splendid entertainment afforded to the guests and the ladies under such trying circumstances. On the evening of the first day a banquet was tendered "to members, ladies





## Editorial

and visitors" at the Restaurant Armenonville. This palatial restaurant, most picturesquely hidden amidst the massive forest trees of the Bois de Boulogne, is famous the world over. About three hundred were in attendance, and when seated, the ladies in their evening finery added such grace and lustre to the occasion that every American present registered a vow to "do this sort of thing when we get back home!" But can we? Perhaps it will be safer to let that beautiful Armenonville fête remain as a unique and marvelously beautiful memory. After the dinner there were no speeches, but all who wished repaired to the Grand Ball Room, where gracious chaperones introduced partners, and soon the room was crowded with dancers, the older as well as the younger element taking part. There was much applause when Dr. Calvin S. Case and his charming wife did the rounds of the room in a *valse*, to the strains of the ever-popular "Blue Danube."

The annual banquet, for the men only, was held at the Continental Hotel on Friday, about two hundred being present. After a beautifully served repast, speeches were made by the Provost of the University of Pennsylvania, Dr. C. N. Johnson, Dr. S. H. Guilford, Dr. Truman W. Brophy, and two or three others, the entire affair passing off most brilliantly, only to be shrouded in gloom at the end by the news that Germany had declared war, and that France would mobilize within twenty-four hours.

On the afternoon of that same day (Friday) Mrs. and Miss Hirschfield entertained the ladies at a reception and tea at their residence on the Avenue des Champ Elysees, and in the evening Mrs. William S. Davenport invited the ladies to attend a *Soiree musicale* at her residence on the Avenue Elisée-Reclus. This proved to be a most brilliant affair, and was much appreciated by the women who were thus so charmingly cared for while the men were banqueting. One would have supposed that enough had been done in a social way, and that in the dread circumstances the program for Saturday might have been abandoned. On the contrary, the clinics were conducted as announced, after which a set luncheon was served for the men in one dining-room of the Hotel Continental, while in an adjoining room the ladies were entertained by Mrs. Field Robinson at luncheon, which was followed by an automobile excursion to the Parc de Trianon, Versailles, returning via Le Parc de



## Items of Interest

Malmaison, where Mrs. W. S. Davenport served tea at her villa, "Les Rochers."

At six o'clock on that same afternoon all France was placarded with posters announcing the mobilization of her entire army, while other bills notified strangers that they would be granted twenty-four hours from midnight on Saturday to leave French territory. Thus tragically terminated one of the finest series of dental meetings that the world has known.

### **The International Dental Congress.**

And then London! On Friday afternoon the Paris papers printed a statement to the effect that all congresses scheduled for London had been abandoned. This was supposed to include the Dental Congress. Dr. Brophy arrived from London just in time for the banquet, and reported that he had heard nothing of abandoning the Congress. Still there was a doubt, until some of the London dentists cabled home and received a reply denying the rumor. On Saturday morning, by eight o'clock, acting upon the advice of Dr. Brophy, Dr. C. N. Johnson and two or three more started for London on the earliest Calais train. Others waited over for the clinics, but the majority had departed before sunset, or had secured places on the night trains. Wise, indeed, were those that took these precautions. A visit to the Gare du Nord, about eight o'clock on Saturday night, reminded one of some of Doré's illustrations in Danté's *Inferno*. The place was packed with a seething, wriggling mass of inhuman humans! Men and women pushed and swore, until New York's most crowded subway station at the busiest hour of the day, by comparison, would be counted a peaceful place of rest. No one made way for anyone. There was one exception. Two porters, each with one end of a coffin on his shoulder and crying "*Ouvrez pour le Mort! Ouvrez pour le Mort!*" were grudgingly granted a narrow passage. Thus this grim harbinger of the nearby future was finally allowed to take a train to its destination. Heaven or hell, no one knew nor cared.

After an hour of hard labor, a *Commissionaire*, with a fair proportion of his senses still in working order and with a sufficient knowledge of English to answer questions, assured the writer that the Sunday morning train for Calais would depart and that trunks would be taken. This in spite of the fact that the trunks already awaiting transit were



piled one on another until the uppermost touched the ceiling. However, one was glad of an official excuse to tell his women folk "we need not start to-night."

Sunday morning dawned beautifully bright and moderately quiet, save for the occasional shrieks of "*Pour Patrie! Pour Patrie!*" of some passing band on the way to barracks. The hotel people declared that "The Calais Dover boat would not go!" that "the Calais train would not go!" and that in no event would trunks be accepted. This at 7:30 A. M. We boarded our buss, trunks atop, and started for the station, in spite of these announcements. Only one of their statements was true. To our amazement the station was almost deserted. Such a transformation in a few hours seemed impossible. Only one gate was open, and that was controlled by military guards. And no one was allowed to pass who had not previously purchased a ticket. By showing tickets in a bunch, so that they could not readily be counted, Dr. Edwin Darby was smuggled past the guards. Trunks, however, were not permitted. Imagine our feelings at leaving all our luggage on the hired bus, hoping that they might be returned to the hotel.

After that, all was easy. The train was not more than two-thirds filled. We traveled in comfort. The Dover boat took us across, despite the hotel men's prophecy, and we had afternoon tea in a Pullman traveling from Dover to London.

A few, however, who had not procured tickets for Sunday, fared less satisfactory. Some did not reach London for ten days, and some went home in the steerage on French liners. But they will tell their own stories at dental meetings this winter.

The opening and closing meetings of the Congress have been described elsewhere in this issue. Of the Section meetings there is little to be said. There were not enough dentists in London to furnish even fair-sized audiences for ten different sections. Everywhere men expressed sympathy for the English officers and committeemen. They had evidently worked so hard and deserved so much more than could be attained in the circumstances. Yet in some sections the audiences made up in quality and interest for what was lacking in numbers.

The great exhibition of dental goods was beautifully arranged, and in itself resembled a World's Fair. Yet the exhibitors and their clerks



## Items of Interest



outnumbered the visitors to such an extent that one wondered how much they would all lose.

In the open air, near this building, a really good table d'hote luncheon was served daily.

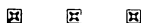
Most of the projected social functions were necessarily abandoned. The reception by the Lord Mayor and Corporation of London at Guildhall occurred on Tuesday night as scheduled and was a notable affair. Many Americans, however, absented themselves because their evening suits were in their trunks in Paris. There was also a reception by the President and Council of the Royal College of Surgeons of England at the College, Lincoln's Inn Fields, on Wednesday, and here a very pleasant and instructive hour was passed in the marvelous museum in which is stored the great Hunter Collection. That one man in a single lifetime could have done so much and have amassed so many specimens of extraordinary interest passes comprehension. Four or five specimens of teeth implanted in the combs of cocks are still in a splendid state of preservation, and perhaps attracted more notice than any other one exhibit. Yet the examples of anomalies in dentition and of individual teeth filled several large cases, and men crowded about them till the end of the reception. All other social affairs, with few exceptions, were abandoned, and the Congress was terminated on Thursday, the last Section paper being read at about 1 P. M. on that day, after which followed the formal closing meeting.

In concluding this rather sad account of what had promised to be and should have been one of the greatest events in dental history, one cannot but remark upon the very dignified and courteous manner in which the Sections were conducted. Too much praise cannot be bestowed upon the various presiding officers who held men within the rules established for the Congress, and yet accomplished this without the slightest suggestion of offense.

After the smoke and grime of battle shall have passed, if England still shall wish it, may her prayer be granted, and may the Sixth International Dental Congress be continued in London.



I AM DISAPPOINTED. Really I thought when I started for Europe that  
 ❖ I would return just loaded up with "table talk." Fact is I had hardly set  
 ❖ foot in France, before all Europe began declaring war. France was  
 ❖ courteous enough to give us twenty-four hours' notice to quit the country.  
 ❖ Personally I managed to make it in twenty, and reached London in  
 ❖ time for the International Dental Congress. But just as soon as I read  
 ❖ my own paper, they closed the Congress. Cause and effect, I suppose.



THUS I HAD VERY few opportunities to sit quietly with confreres and  
 ❖ discuss dental topics. Of course, I met a few men, as for example on  
 ❖ the boat going over, but the most important subject with them all seemed  
 ❖ to be the question: "If it gets rougher, and the ship starts rolling, would  
 ❖ it be advisable to take Mothersills?" In Paris it was just as bad. In  
 ❖ the open air café at the Continental, the talk was all about whether there  
 ❖ would or would not be war. At the Moulin Rouge one was asked: "Did  
 ❖ you ever see the like?" At the beautiful dinner at Armenonville where  
 ❖ the ladies dined with us, the comment was: "Why don't we do this in  
 ❖ America." In London it was no better. Whether in the Lounge at the  
 ❖ Savoy, in the Lobby of the Cecil, at luncheon at the Ritz, dining at the  
 ❖ Piccadilly, or discussing one of those wonderful joints at Simpson's, only  
 ❖ two topics were discussed. "Have you recovered your luggage?" and "Do  
 ❖ you think we will be obliged to go home in the steerage." Occasionally  
 ❖ a man said a word or two about Uncle Sam sending transports, but no  
 ❖ one went into transports at the prospect.



SO ALL THE WAY back, when I was not leaning over the rail looking for  
 ❖ a German cruiser, or peering through the fogs, or gazing at the beautiful  
 ❖ iceberg which passed us coldly by, I was wondering whether the boys  
 ❖ would meet me at the boat with a band, rush me off to a Grill or a  
 ❖ Roof Garden and talk shop long enough for me to pick up a few stray  
 ❖ bits to chat about. But sad is my lot! They have heard about the war



- ❖ over here, and all I can get out of folks is: "The Kaiser did!" or "The Kaiser didn't!" or, "Will the Kaiser?" or "Won't he?"

■ ■ ■

IN THIS PREDICAMENT I grabbed up half a peck of letters that had arrived during my absence, and went up to a quiet spot in Central Park, far, far from the telephone's tinkle or the newsboy's sonorous song. And lo! in the lot I found three letters which fit together singularly well. They are so totally different.

■ ■ ■

BEFORE WE GO any further let me distinctly declare that I am not here inaugurating any attempt to publish talks on business management. The aim of "Items of Interest" is to tell you how to do your work, not how much to charge for it, nor how to collect your bills. Nevertheless we may turn aside from the regular rut for just once in response to the following appeal.

■ ■ ■

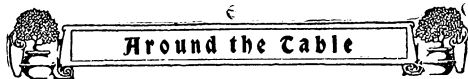
IN ONE OF THE letters I find the following from a good friend of mine, a gentleman in Kentucky. He says: "Will you give me your frank opinion on the following: Is it not true that he who can profit by the experiences of others, is the man who succeeds the fastest? Take away the avenues of learning after graduation, and what progress would be made by the individual? We have had some articles on office management, efficiency, and business talks. But what has been printed on various means of establishing a practice? Why withhold such knowledge from the worthy young man, and leave him by bitter experience to get through and around the pitfalls that he is sure to encounter? Your "Around the Table" is a good department. Why could you not give us in it a talk on practice building. You need not recite personal histories, but perhaps you could weave a story based on the experiences of prominent and successful men. I have made bitter mistakes myself, but by questioning others I have obtained many good ideas. Yet there is much that I would like to know. Does dental literature give me and others like me any enlightenment?"

■ ■ ■

I HAVE PRINTED the above appeal in full, because of my reluctance to launch this magazine into any campaign of business talks, and thus it will be understood that I turn aside from this fixed policy only because at the moment it seems to me that the claim of my Kentucky friend is just. It is true that the young man is left altogether too much to his own resources in gaining a foothold in professional success. Considering the selfish indifference of the majority, what wonder that these young feet slip at times and that they wander into paths unprofessional but more immediately remunerative!

■ ■ ■

THEREFORE I will cheerfully accede to the request of my Kentucky friend, especially as I believe that I can give some hints that may prove of use. It happens that some ten years ago I gave such a talk to the Alumni and graduating class of the University of Buffalo. A month ago in Paris I was invited to take luncheon with an American dentist, in his truly sumptuous offices, on a fashionable boulevard. He showed me over



- ❖ this place, reminding me of the above mentioned lecture; he recalled
- ❖ that he had accompanied me to my hotel after the meeting for a further
- ❖ talk on the same subject and then, waving his hands about his rooms,
- ❖ he said: "Doctor, I owe all this, all my success to you; to the advice
- ❖ that you gave me that night!"

❏ ❏ ❏

THIS, OF COURSE, IS not true. No man owes success in life to anyone

- ❖ but himself, except in a purely subjective way. Yet it is true as my
- ❖ Kentucky friend says that, "he who can profit by the experience of
- ❖ others, is the man who succeeds the fastest!" And the one or two bits
- ❖ of advice which I can give have been proven of value by myself and
- ❖ numerous others besides the gentleman in Paris.

❏ ❏ ❏

BUT FIRST LET me reproduce, at least, in part the two other letters to

- ❖ which I have alluded. The first, because it seems to point out some of
- ❖ the pitfalls that are difficult to avoid; the second, because the writer
- ❖ most adroitly gives us a pen picture of many of the humans that we
- ❖ must serve.

❏ ❏ ❏

THE FIRST LETTER is signed "James Ernest," and is postmarked in Con-

- ❖ necticut. That is not the gentleman's real name, but James is certainly
- ❖ in earnest, and evidently has had some experiences which will be familiar
- ❖ to many, and may well be seriously studied by those just starting out.
- ❖ Therefore peruse, digest and profit by what James Ernest tells us.

❏ ❏ ❏

"WHAT ARE YOUR feelings when you visit a cemetery? You are sad,

- ❖ rather than mad, are you not? Have you a cemetery in your office?
- ❖ No? Lucky man! Or liar perhaps! Anyway, I have one in mine, and
- ❖ every time I bury a dead-beat I am Sexton, Minister and Mourner, all
- ❖ in one. Chiefly Mourner. I just hate these funereal functions, and I am
- ❖ tired of reading such epitaphs as 'Sacred to the Memory of Profit and
- ❖ Loss!'

❏ ❏ ❏

"BUT WHAT CAN WE DO? Where find a remedy? Yet there should be

- ❖ one. If a bricklayer were refused payment for the last hour of a day's
- ❖ work, he would hurl aside his trowel and precipitate a strike which would
- ❖ tie up the whole works. I hope I am as professional as my neighbor,
- ❖ yet even the preacher receives his stipend for his preachments. There
- ❖ was a time when I could proudly boast that there were no bad accounts
- ❖ on my books, but alas, that day has past, I fear, like the bloom of youth,
- ❖ never to return. My but that was a grand old time! Just out of
- ❖ school, and needed the money! Hence the rule: "Cash at every sitting,"
- ❖ and patient and dentist both satisfied. Then stalked into my office that
- ❖ beguiling gentleman, Mr. Credit, and soon thereafter occurred the first
- ❖ interment in my business graveyard. Friend, will you saunter with me
- ❖ under the weeping-willows and let me recite to you the brief histories
- ❖ of a few of my buried dead?

❏ ❏ ❏

"OBSERVE THIS tiny headstone? Only a small grave this one. The bill

- ❖ rendered was for five dollars, and the date of service two years back.



- ❖ The young Miss, a daughter of a retired physician, called with the bill
- ❖ in one hand and two-fifty in the other, and placidly informed me that
- ❖ her 'mother said that was quite enough to pay for what had been done.'
- ❖ Neat, wasn't it? Quite simple, too, and can be utilized by almost any
- ❖ young person.

❖   ❖   ❖

"THIS BLACK STONE marks the resting place of a young man, a stranger  
❖ who paid me two visits and received a gold crown. Nothing was said about  
❖ payment until the crown was firmly cemented in place, when he informed  
❖ me that he had brought no money with him as he had not expected me  
❖ to finish that day. Shades of Blackstone, what can a busy dentist do  
❖ with a case like that? What did I do? Well, by the end of a year I  
❖ collected all but one dollar, less twenty per cent. to a collector. By the  
❖ way that bill collector is a sort of silent partner of mine, and he earns  
❖ his commissions at that.

❖   ❖   ❖

"A NEAT VARIATION of the above is a promise to pay as soon as the  
❖ work is completed. Can you ask a lady to do more? When the bridge  
❖ is set beyond removal, the lady discovers that she left her pocketbook  
❖ at home on the piano. This trick is usually a complete success. At  
❖ least, I have a whole row of such 'remains' in my cemetery.

❖   ❖   ❖

"THERE WAS ONE WOMAN, a champion in her class. Talk about theft  
❖ from the person? This was like grabbing a man's purse on the highway  
❖ and telling him to wait; that you are just going to the corner grocery  
❖ to get some change and will be right back. This feminine hold-up per-  
❖ son was of regal manner; perfectly ladylike and carried things off in the  
❖ 'James! Call the carriage' style. She was a casual patient, that is with-  
❖ out appointment. Had a cleansing and several fillings. Then asked for  
❖ my bill, expressed satisfaction, and pleasantly informed me that she  
❖ would step over to the bank and get some money. Why! I thought she  
❖ must be the banker's wife! But later I learned that the banker was a  
❖ bachelor.

❖   ❖   ❖

"THIS MONUMENT was erected to the memory of a lady of moderate  
❖ means who owes two dollars balance, but refuses to pay because a friend  
❖ declared that I had overcharged her. Next to her, is a woman who owes  
❖ four dollars for a filling done for her daughter. Declines to settle be-  
❖ cause she had told the girl not to have the work done. This grave with  
❖ the For-get-me-nots growing on it, recalls a case of unfinished treat-  
❖ ment for a daughter of a physician. The doctor wrote that being  
❖ a medical man, if his daughter needed 'treatment' he would do it him-  
❖ self, and I need only concern myself with fillings.

❖   ❖   ❖

"IN THIS VAULT I place uncollected accounts against men whose wives  
❖ supply and handle the cash. This genus homo dresses well, is the most  
❖ friendly, sociable cuss imaginable; wants his mouth put in perfect order,  
❖ regardless of time or expense, and then blandly tells you to send the  
❖ bill to 'wee wifey.' In the first experience of this sort, 'wee wifey' called





- ❖ and proved to be a thorough business woman. For a discount of
- ❖ thirty-three per cent. she would settle. Why argue with a lady? I
- ❖ settled.

□ □ □

"JESTING ASIDE, why should we not receive full fees for what we earn?

- ❖ Some of you will laugh and say: 'If he had a practice like mine, he
- ❖ would not be bothered with bad accounts.' It is well enough for those
- ❖ who are practicing in ideal environments to talk thus, but the average
- ❖ dentist works under poor conditions, and gets low prices for his work.
- ❖ He also must cater to people who try to save money on dental bills
- ❖ just as they do when buying food or clothes. It is an ideal proposition,
- ❖ of course, to have patients who permit you to do what you please,
- ❖ charge what you please, and who send a check on receipt of bill. But
- ❖ how many of us have patients like that, and to those who have not, what
- ❖ is the best solution of the problem of receiving a fair return for ser-
- ❖ vices rendered?"

□ □ □

HERE ENDETH the recitation of woes by James Ernest, and in conclusion

- ❖ he asks a question the answer to which would be helpful to many es-
- ❖ pecially to beginners. But let us leave that for the present, and cross
- ❖ from Connecticut to Massachusetts to learn whether experiences differ
- ❖ much in these adjacent territories. The following is contributed by Dr.
- ❖ Horace F. Gleason, of Malden, who informs me that he has had thirty
- ❖ years of experience. He declares that he wishes to offer "A few Don'ts
- ❖ for our younger brothers, and as a gentle reminder to older ones." Here
- ❖ they are.

□ □ □

"DON'T BE LATER than 7.30 A. M. in reaching your office, nor leave before

- ❖ 9 P. M. Remember you are there solely to serve your fellowmen and
- ❖ women. Someone may have an ache, between these hours, and may
- ❖ need you.

□ □ □

"DON'T GET PEEVISH if you wait till eight o'clock at night to extract

- ❖ some teeth for Mr. Jones, and he fails to bring any money with him.
- ❖ It is your part to do good, and his part to do you, if he can.

□ □ □

"DON'T BE SURPRISED if Miss Araminta Brown advises her friends not

- ❖ to patronize you because you smoke. And try to forget that when you
- ❖ worked for her, her breath reminded you of a last year's 'fresh egg.'

□ □ □

"DON'T CHARGE more than three dollars for a porcelain crown, nor more

- ❖ than five for a gold one, and include 'treatment and filling of roots.'
- ❖ Your patients can tell you of many 'first-class dentists' who charge no
- ❖ more. Anyway, they need the money for other things.

□ □ □

"DON'T OBJECT if Sallie Smith makes four separate appointments and fails

- ❖ to keep them. No doubt she 'had company,' or 'Jack came to take her
- ❖ for a ride.' She will surely explain it to you when she makes her sixth
- ❖ appointment.



"DON'T REFUSE TO WORK all day on Sunday. People can't be expected  
❖ to lose any time from their own business just to accommodate you. So  
❖ you must cheerfully work for Jews on Sunday mornings, and for Christians in the afternoon, because the latter must attend Divine Services in the mornings. If Sunday should prove to be sunny they may all go  
❖ automobiling, both Jews and Gentiles. Well! Never mind! That will  
❖ enable you to read your Sunday paper.

□ □ □

"DON'T BE ANGRY if some one makes a contract with you for forty dollars  
❖ for work well worth sixty, and after three years refuses to pay the last  
❖ ten dollars because 'one of your fillings did not stay.' Use better cement  
❖ next time.

□ □ □

"DON'T WORRY YOUR PATIENTS about their bills until their accounts  
❖ are over three years old. If you do, you may lose their custom.

□ □ □

"DON'T MIND IF some important patient, for whom you have done careful  
❖ and conscientious work goes to a 'brother' dentist, because 'your work  
❖ was not up to standard.' Doubtless your 'professional brother' has  
❖ waited a year or more for an opportunity to explain how poor your  
❖ fillings are and how much better and newer his method is.

□ □ □

"DON'T TAKE A VACATION, or if you do, don't be gone over a week,  
❖ because Mrs. Henrietta Julia Brown-Sequard will almost surely call  
❖ while you are away, despite the fact that you gave her a month's notice  
❖ of your intended absence.

□ □ □

"DON'T REFUSE to repair without charge the plate you made for Mr.  
❖ Thompson last year, and which he returns with the six front teeth off,  
❖ explaining that he was only eating soft bread. Bread is the staff of life,  
❖ and you can't expect your patients to live on soup just because your  
❖ plates are weak.

□ □ □

"IN SHORT, DON'T bother about your own health or cater to your own  
❖ comforts. You are a professional man, a public benefactor, and should  
❖ be glad you are alive and enjoying the opportunity to do a few trifling  
❖ services for your fellowmen. Thus live your life and when you die and  
❖ your friends 'chip in' for the funeral expenses, no doubt the local paper  
❖ will mention your passing, and allude to your few virtues, at the same  
❖ time noting that 'the widow and her three children have gone to her  
❖ father's home.' Verily! Verily, blessed are the meek, for they shall inherit the (six feet of) Earth! Ah-men!"

□ □ □

THE COMMUNICATIONS of these gentlemen have proven to be so interesting that I have been unable to curtail them sufficiently to leave room  
❖ for my promised reply to my Kentucky friend. I had hoped to conclude  
❖ this chat, but shall be obliged to resume the discussion next month.



### **National Society Meetings.**

AMERICAN INSTITUTE OF DENTAL TEACHERS, Ann Arbor, Mich., January 28-30, 1915.

Secretary, Dr. J. F. Biddle, 517 Arch St., N. S., Pittsburgh, Pa.

PANAMA-PACIFIC DENTAL CONGRESS, San Francisco, Cal., 1915.

Secretary, Dr. Arthur M. Flood, 240 Stockton St., San Francisco, Cal.

### **State Society Meetings.**

OHIO STATE DENTAL SOCIETY, Columbus, O., December 1-3, 1914

Secretary, Dr. F. R. Chapman, 305 Schultz Bldg., Columbus, O.

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### **Those Wishing to Register in Indiana Please Notice.**

In compliance with Section 9, an Act to regulate the practice of dentistry in the State of Indiana, approved March 8th, 1913.

On or before the 31st day of December of each year each dentist now licensed or subsequently licensed to practice dentistry in this State shall transmit to the Secretary of the State Board of Dental Examiners his signature and address, together with the fee of one dollar and the number of his or her registration certificate, and receive therefor a renewal license certificate. Said renewal license certificate shall be at all times properly displayed in the office of the one who is named in the license, and no person shall be deemed in legal practice who does not possess such renewal certificate. Any license granted by said board shall be cancelled and annulled if the holder thereof fails to secure the renewal



certificate herein provided for within a period of three months after December 31st of each year; *Provided*, That any license thus cancelled may be restored by the board upon the payment of a fee of five dollars, if paid within one year after such cancellation.

Notices will be mailed to all dentists registered in Indiana to their last known address, on or before December 31, 1914. Failure to receive such notice will not be an exemption or an excuse for non-payment. In such cases all persons should notify the Secretary, giving their correct address. This also applies to all those living outside the State.

Respectfully,

FRED J. PROW, Secretary.

Bloomington, Indiana.

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### **Michigan Licentiates Please Note.**

The licenses of all Michigan licentiates, whether practicing in the State or not, who have not paid their annual registration fee, will be revoked at the next regular meeting of the board, which will be held in Ann Arbor, November 9th to 14th.

F. E. SHARP, Secretary.

Port Huron, Mich.

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### **Michigan Board Meeting.**

The semi-annual meeting of the Michigan State Board of Dental Examiners will be held in the Dental College at Ann Arbor, commencing Monday, November 9th, and continuing through the 14th. For full particulars and application blanks address

F. E. SHARP, Secretary.

Port Huron, Mich.

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### **Ohio State Dental Society.**

The Forty-ninth Annual Meeting of the Ohio State Dental Society will convene in Columbus on Tuesday, December 1st, continuing through Wednesday and Thursday.

Papers on live subjects by able men on Tuesday and Wednesday afternoon; clinics, Wednesday and Thursday afternoons.

The program is not sufficiently perfected to announce at this time, but a strong program and big meeting are assured.

The entire State is now organized into components and a very large attendance is anticipated.

F. R. CHAPMAN, Secretary.

305 Schultz Bldg., Columbus, Ohio.



### **Montana State Board of Dental Examiners.**

The Montana State Board of Examiners will hold a session on the second Monday in January, 1915.

DR. G. A. CHEVIGNY, Secretary.

Butte, Montana.

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### **Maryland Board of Dental Examiners.**

The Maryland Board of Dental Examiners will meet for examination of Candidates for certificates November 5th and 6th, 1914, at the Baltimore College of Dental Surgery, Baltimore, at 9 A. M.

For application blanks and further information apply to

F. F. DREW, Secretary.

701 N. Howard St., Baltimore, Md.

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### **Rhode Island State Board of Registration in Dentistry.**

The next meeting of the Rhode Island State Board of Registration in Dentistry for the examination of candidates will take place at the State House, Providence, R. I., Wednesday, Thursday and Friday, the 7th, 8th and 9th of October.

WM. B. ROGERS, D.M.D., Secretary.

171 Westminster St., Providence, R. I.

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### **Indiana State Board of Dental Examiners.**

The next meeting of the Indiana State Board of Dental Examiners will be held at the State House, Indianapolis, commencing Monday, November 6th, and continuing five days. For application blanks and full particulars address

DR. FRED W. PROW, Secretary.

Bloomington, Indiana.

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### **Wisconsin State Board of Dental Examiners.**

The Wisconsin State Board of Dental Examiners will convene in Milwaukee at Marquette University on December 14, 1914, at 10 A. M., for examination of applicants to practice in Wisconsin.

High school diploma, application and \$25 fee to be filed with the secretary ten days prior to above date.

Dental diploma to be presented in advance of the examination.

Junior dental students presenting a clear card for two years' unconditioned work from a reputable dental college and filing a high school diploma, or its full equivalent, will be permitted to participate in the



theory examination in the following six major subjects: Anatomy, physiology, histology, chemistry, bacteriology, materia medica.

The grades made in these subjects will be credited at subsequent examinations.

Special application blanks for this examination and \$10 fee, together with high school credits, to be filed ten days in advance.

S. H. CHASE, President.

W. T. HARDY, Secretary.

1404 Majestic Bldg., Milwaukee, Wis.

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### **Virginia State Board of Dental Examiners.**

The Virginia State Board of Dental Examiners will meet for the examinations of applicants to practice dentistry in Virginia, in the city of Richmond, Va., October 6, 1914, 9 A. M.

For further particulars address

DR. J. P. STIFF, Secretary.

Fredericksburg, Va.

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### **Wisconsin State Dental Society.**

At the last meeting of the Wisconsin State Dental Society the following officers were elected:

President, Dr. Wm. Hopkinson, Milwaukee; Treasurer, Dr. A. Grop-per, Milwaukee; Secretary, Dr. O. G. Krause, 1209 Wells Bldg., Milwaukee.

The next meeting will be held at Oconomowoc, July 13-14-15, 1915.

O. G. KRAUSE, Secretary.

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### **Massachusetts Board of Registration in Dentistry.**

A meeting of the Massachusetts Board of Registry in Dentistry, for the examination of candidates, will be held in Boston, Mass., October 21-22-23, 1914.

Candidates who have applied for examination will report to the Secretary, Wednesday, October 21st, at 10 o'clock A. M., at Tufts College Dental Infirmary, Huntington Avenue, prepared with patient, rubber-dam, gold, plastic filling materials and instruments, to demonstrate their skill in operative dentistry. The Board in every instance selects the cavity to be filled. Partially prepared cavities never accepted.

The theoretic examination—written—will include operative dentistry, prosthetic dentistry, crown and bridgework, orthodontia, anatomy, histology, surgery, pathology, materia medica, therapeutics, physiology,



bacteriology, anesthesia, chemistry and metallurgy, and will be held at Civil Service Room, No. 15 State House, commencing Thursday, October 22d, at 10 o'clock A. M. Candidates are required to bring pens.

All applications, together with the fee of twenty dollars, if first examination, must be filed with the Secretary of the Board ten days before the date of examination, as no application for this meeting will be received after that date.

*Candidates for second and subsequent examinations will be required to fill out an application blank (Form 2) and forward to the Secretary.*

Every candidate for examination must be twenty-one years of age.

Application blanks may be obtained from the Secretary.

Applications must be made out in candidate's own handwriting.

Temporary licenses are never granted.

The fee for third and subsequent examinations is \$5.00.

G. E. MITCHELL, D.D.S., Secretary.

14 Water Street, Haverhill, Mass.

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### **Northeastern Dental Association.**

A meeting of the Northeastern Dental Association is to be held in the Hotel Somerset, Boston, Mass., October 15, 16 and 17, 1914. The officers and committee are doing their best to have a rousing good meeting. Please remember the dates and attend.

DR. O. KINSMAN, President.

DR. CHAS. F. KREPPPEL, Secretary,

10 Hyde Park Ave., Milton's Block, Forest Hills, Mass.

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### **Federation Dentaire Internationale.**

At the annual meeting of the International Dental Federation, London, England, August 6, 1914, the following officers were elected for 1914-15:

Hon. President—W. B. Patterson, London.

President—Truman W. Brophy, Chicago.

Vice-Presidents—Harvey J. Burkhart, Batavia, N. Y.; F. Schaeffer-Stuckert, Frankfort-on-Main; M. Roy, Paris; W. Guy, Edinburgh; Rudolph Weiser, Vienna; Vincenzo Guerini, Naples; J. Howard Mummery, London; N. Etchepareborda, Buenos Ayres; Ernst Jessen, Strassburg.

Secretary-General—Florestan Aguilar, Madrid.

Assistant Secretaries—Burton Lee Thorpe, St. Louis; C. Van der Hoeven, The Hague; G. Villain, Paris; B. Landete, Madrid.

Treasurer—Edmond Rosenthal, Brussels.

Next place of meeting, San Francisco, August 30, 1915.

BURTON LEE THORPE, Asst. Sec'y.



### **Union Meeting of the Fifth, Sixth, Seventh and Eighth District Dental Societies.**

A union meeting of the Fifth, Sixth, Seventh and Eighth District Dental Societies, State of New York, will be held at the Hotel Iroquois, Buffalo, N. Y., November 19th, 20th and 21st, 1914.

J. PORTER MALLORY,  
Chairman of Local Committee.

463 W. Ferry St., Buffalo, N. Y.

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### **Alumni Association of the College of Dentistry, State University of Iowa.**

The Tenth Annual Alumni Clinic of the State University of Iowa College of Dentistry will be held at Iowa City October 22-23-24, 1914. On October 24th the University will have its annual home-coming with the Iowa-Minnesota football game in the afternoon. This, combined with our exceptional program, should make the attendance unusually large at this clinic.

DR. JOHN VOSS, Secretary.

Iowa City, Ia.

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### **The Connecticut State Dental Commission.**

The Connecticut State Dental Commission hereby gives notice that it will meet at Hartford November 19-20-21, 1914, to examine applicants for license to practice dentistry in this State, and to transact any other business proper to come before it.

Application blanks, copies of the revised requirements, rules, etc., will be mailed by the Recorder upon request.

EDWARD EBERLE, Recorder.

902 Main St., Hartford, Conn.

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### **George Edwin Hunt.**

The following resolution was adopted by the Wisconsin State Dental Society at its meeting in Fond du Lac, July 16, 1914:

*"Whereas*, Almighty God in His infinite wisdom has seen fit to remove from the scene of his earthly labors, Dr. George Edwin Hunt, M.D., D.D.S.; and

*"Whereas*, The Wisconsin State Dental Society desires to record its appreciations of him as a man and its sense of sorrow at his death;

*"Therefore, Be it Resolved*, That the Wisconsin State Dental Society extends to the family of the deceased their sincere sympathy in their bereavements, and that this resolution be spread upon its minutes and a copy be sent to the family and to professional journals for publication."

Committee: W. F. FAUST,  
CHAS. L. BABCOCK,  
F. A. HEILFUSS.